

**AGE ESTIMATION BY USING ERUPTION OF  
PERMANENT TEETH – A COMPARATIVE STUDY IN  
LOCAL POPULATION TO PROVE / DISPROVE AGES  
OF ERUPTION USED IN ROUTINE PRACTICE**

Dissertation submitted for partial fulfilment  
of the requirements for the degree

**M.D. (Forensic Medicine)  
BRANCH – XIV**

**DEPARTMENT OF FORENSIC MEDICINE,  
TIRUNELVELI MEDICAL COLLEGE,  
TIRUNELVELI - 620711.**



**THE TAMILNADU  
DR.M.G.R.MEDICAL UNIVERSITY,  
CHENNAI.  
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## **BONAFIDE CERTIFICATE**

This is to certify that the work embodied in this dissertation entitled “Age estimation by using eruption of permanent teeth – A comparative study in local population to prove / disprove ages of eruption used in routine practice” has been carried out by Dr. K. Tamilmani, M.B.B.S., a Post Graduate student under my supervision and guidance for his study leading to Branch XIV M.D. Degree in Forensic Medicine during the period of June 2010 to May 2013.

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I, Dr. K. Tamilmani, M.B.B.S., solemnly declare that this dissertation titled “Age estimation by using eruption of permanent teeth – A comparative study in local population to prove / disprove ages of eruption used in routine practice” is the bonafide work done by me under the expert guidance and supervision of **Dr.A.Selvamurugan.,MD., D.N.B., MNAMS.,** Associate Professor & Head of the Department of Forensic Medicine, Tirunelveli Medical College, Tirunelveli – 11. This dissertation is submitted to The Tamil Nadu Dr. M. G. R. Medical University towards partial fulfilment of requirement for the award of M.D. Degree (Branch XIV) in Forensic Medicine.

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Date:

**Dr. K. Tamilmani.**

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## ABBREVIATIONS

&	-	And
<	-	Lesser than
>	-	Greater than
%	-	Percentage
$\pm$	-	Plus / minus
CE	-	Completely erupted
CI	-	Central Incisor
D/o	-	Daughter of
Ed.	-	Edition
HS	-	Highly significant
i.e.	-	That is
j	-	Journal
n	-	Number of subjects
NCE	-	Not completely erupted
NE	-	Not erupted
No	-	Number of cases
L	-	Left



LJ	-	Lower Jaw
Ltd	-	Limited
M1	-	First Molar
M2	-	Second Molar
M3	-	Third Molar
NS	-	Not Significant
P	-	Probability significance
PASW	-	Predictive and analysis software
PM1	-	First Pre Molar
PM2	-	Second Pre Molar
S.D	-	Standard Deviation
S.E	-	Standard Error
SP18	-	Statistics-18
S/o	-	Son of
SI. No	-	Serial number
LI	-	Lateral Incisor
SES	-	Socio economic Status
S	-	Significant
Stat.	-	Statistical
UJ	-	Upper Jaw

## INTRODUCTION

Estimation of age is one of the important medico legal works where medical knowledge is applied in rendering Justice to the public and to the State. Assessment of age is often required in civil and criminal litigations. Assessment of age of an individual by examination of teeth is one of the universally accepted methods of age estimation. Eruption of teeth is one of the changes observed easily among various dynamic changes that occur from formation of teeth to the final shedding of teeth. The process of gingival eruption of teeth is one that cannot be dated exactly but can readily be recorded as having occurred or not having occurred in any individual. This fact can be made use of in ascertaining the average age of eruption of the tooth <sup>(46)</sup> (Kumar and Sridhar, 1990).

The notion of the age and time had come into the mind of the human being for centuries, possibly millennia. In this universe, most of the things, natural or artificial can be dated, numbered, quantified or measured. One can also measure life span of a person as well as one's age from the moment of his / her conception. India is a very vast country with diversity in climate and population. Hence, no uniform data can be applied to this whole country. Teeth are known to aid in personal identification and age estimation as they are highly durable and resist putrefaction, fire, chemicals etc. The permanent teeth will help in age determination from six years to twenty – five years. Some temporary and

permanent tooth do co-exist up to twelve years of age. Eruption of teeth is known to be affected by dietary, climatic, racial and geographical variations <sup>(90)</sup> (Swami et al, 1992).

Forensic Odontology is a branch of Forensic Medicine which deals with the examination of teeth in all aspects. By definition, it is the application of dental knowledge in rendering Justice. Although Forensic Odontology is a relatively small specialty, it has been utilized since many years, especially in establishing identity. The first reported crime in the history of mankind was solved when bite marks were discovered in the remains of the Forbidden fruit in the Garden of Eden and identified as those of the Adam and Eve <sup>(92)</sup> (Tedeschi, Eckert and Tedeschi, 1977).

In a developing country like our India, a large number of people are illiterate and have no knowledge or records of their date of birth which is required by law enforcing agencies in matters like criminal responsibilities, identification, judicial punishment, consent, rape, criminal abortion, employment, attainment of majority, kidnapping and prostitution <sup>(70)</sup> (Pathak et al, 1999). Age estimation is also required for admission purposes at the time of schooling, joining services and during retirement. Estimation of age is also required for obtaining old age benefits. Hence, scientific determination of age is very important.

Age can be determined from a variety of factors like the appearance of ossification centres and their fusions during skeletal development, from height and weight which is applicable in early periods of life, dental development and changes occurring at puberty like appearance of hair and their growth and colour changes, development of breast in females, starting of menarche and from menopause <sup>(14)</sup> (Chhokar, Aggarwal and Bhardwaj, 1992).

From teeth, age can be estimated from eruption of teeth when the crowns have been just projecting out from the gums, from microscopic examination of a section of central part of teeth by counting the cross striations which appear daily as devised by Boyde. Gustafson had also estimated the age of an individual above twenty-five years by using six criterias like attrition, periodontosis, secondary dentine formation, root resorption, root transparency and cementum apposition. If we take into consideration all these factors, then we can estimate the age of an individual within a narrow range. If we take all these factors individually, then significance is of less value because their range is much wider. But from all these factors, eruption of the teeth gives a very good idea of estimation of age up to 25 years. There is evidence that dental development is less affected than skeletal development by malnutrition and hormonal disorders. The teeth also helps in identification, if one is having detailed records of teeth and presence of any peculiarities like

malposition, overlapping, malrotation, decay, filling with different materials, gaps or dentures. The eruption of temporary teeth may be delayed for a considerable time due to diseases like rickets and other nutritional deficiencies <sup>(22)</sup>.

Dental age assessment can be done clinically or radiologically. By radiographic method, it is possible to follow the formation of crowns and roots of teeth and their calcification. The clinical method to assess dental age is based on emergence of teeth in the mouth. This method is more suitable, since it is not an invasive procedure and does not require any special equipment, expertise and is more economical. Tooth formation is the best choice for estimating the age, as variations are less as compared to other development factors. However, it should be used along with other parameters such as physical development, changes occurring at puberty and old age, appearance and fusion of ossification centers. Hence, while estimating the age, sum total of all these factors should be taken into consideration.

There are charts and tables for the assessment of age during development period, which shows the formation, eruption, and calcification of teeth. For this purpose, table of Krenfeld and Logan, further modified by Kronfeld and Schour (1939) is commonly used <sup>(57)</sup> (Mc Donald and Avery, 1998), which has been accepted standard for many years. These are carefully reviewed by Lund & Law and

established earlier ages of teeth eruption than the previously accepted value for initial calcification.

Most of the tables and figures presented pertain to children from Europe and America. There is no reference of the difference between these countries and warmer parts of the world. Thus there can be variations to diversity in climate, region, geographical distribution, race, nutritional status, economic status and urbanization. The diseased temporary tooth may be lost earlier than normal and hence there can be premature eruption of permanent teeth and there can be deviation in the sequence of eruption than the normal. So, the charts of eruption can be used with limitations to race and country.

The population of India is very huge and its climatic conditions differ in different regions. A cross sectional study was carried out in Tirunelveli District to assess the eruption time of permanent teeth between the age group of six years to twenty five years.

**Aim & Objective:**

To prove / disprove ages of eruption of permanent teeth used in routine practice in correlation with local population.

**Justification for study:**

At present, we are using same ages of eruption of permanent teeth for all medico-legal works in many parts of India. But eruption of teeth is based upon various parameters like genetic makeup, diet, environmental factors etc. Many present works are to find out whether there is any change in ages of eruption of permanent teeth between the routinely practiced ages of eruption and local population by doing field work.

**Methodology:**

Assess ages of eruption of permanent teeth in age group from 6yrs to 25yrs by doing dental examination of school and college students.

**Risks:** No risk to the subjects and investigator.

**Benefits:** Benefit to carry out medico-legal works efficiently.

**Outcome:**

May prove or disprove the practicing ages of eruption of permanent teeth in medico-legal works.

**Statistical analysis:**

To finalize the data was collected and come to a conclusion regarding ages of eruption of permanent teeth.

**National Significance:**

If the age of permanent teeth eruption is proved, we shall use the same ages of teeth eruption that is routinely practiced in our medico-legal works. If it is disproved, extensive work should be conducted in various States to have their own ages of permanent teeth eruption for doing medico-legal works efficiently.



## **REVIEW OF LITERATURE**

Lall and Townsend (1939) studied 125 girls in Lucknow and they found that one third molar teeth erupts between the age of 15 and 16yrs, two third molar teeth erupts between the ages of 16 and 17yrs and three third molar teeth erupts between the age of 17 and 18yrs <sup>(47)</sup>.

Shourie (1946) carried out investigations in school boys and girls in Madras and Lahore and found the mean age of eruption of permanent teeth as 7.10 yrs for central incisor, 7.88 yrs for lateral incisor, 10.87yrs for canine, 10.50 for first bicuspid, 11.56yrs for second bicuspid, 6.48 for first molar and 11.79 for second molar <sup>(84)</sup>.

Gonzales et al (1954) described that the teeth may give reliable information as to the age in childhood and youth. Beyond adult life, the changes are too uncertain to be of value. The permanent teeth eruption starts at sixth year and by twelve to fourteen years, all the permanent teeth except the third molars or wisdom teeth erupts <sup>(24)</sup>.

Polson (1955) described that the first permanent molar erupts in boys at the age of 73 to 74 months where as in girls, it erupts at 70 to 72 months. The central incisors showed a wide range in the time of eruption, which were 72 to 84 months in boys and 69 to 79 months in girls. The eruption of third molar is variable, and these teeth are prone to impaction. When present, one is more than seventeen years <sup>(72)</sup>.

Smith (1955) described the earlier eruption of teeth in the lower jaw than in the upper jaw. Permanent dentition begins at 6 years of age by eruption of 1st molar behind the 2nd maxillary temporary teeth, permanent dentition is completed at 17-21 years by eruption of wisdom teeth is very variable and is never before seventeen years of age <sup>(87)</sup>.

Kerr (1957) described in his text book of Forensic Medicine, eruption of permanent teeth starts at six years with the eruption of first molar and then central incisors, lateral incisors, canines, first bicuspid, second bicuspid, second molar and third molar at seven, eight, eleven-twelve, nine, ten, twelve-thirteen, and seventeen to twenty-five-years <sup>(41)</sup>.

Glaister and Rentoul (1966) described that permanent teeth appear from sixth year to twelfth year. There is greater uncertainty respecting the time of eruption of the third molars than of the other teeth. In odd cases, they do not appear till adult age <sup>(23)</sup>.

Grewal (1973) described eruption of permanent teeth is at seventh to eighth year for central Incisor, eleventh to twelfth year for canine, ninth to tenth year for central premolar, tenth to twelfth year for post premolar, sixth to seventh year for first molar, twelfth year for second molar, third molar at seventeen to twenty five years or any age after this <sup>(26)</sup>.

Billewicz et al (1975) studied on 635 West African (Gambian) children within the range of 4.5 to 14.0 years. They found no difference between eruption ages of homologous permanent teeth on left and right sides of the same jaw. Teeth erupted earlier in the lower jaw with the exception of 1st and 2nd premolars. The eruption in females was earlier than males. One can estimate the calendar age from permanent dentition with an error of 0.5 years for one tooth to twelve teeth and over 1 year for twelve teeth or more <sup>(7)</sup>.

Tedechi, Eckert and Tedechi (1977) described that from birth to six months of life, accurate age estimation can be based on the mineralization of the deciduous crowns and from then up to 13 months of age, estimation may be determined by the state of eruption. There is no significant influence of external factors on eruption of deciduous teeth. From twelve months to fourteen years, age determination has been based on a relatively regular eruption pattern. From 14 years to 25 years, eruption of 3rd molar is often a valuable finding <sup>(92)</sup>.

Savara and Steen (1978) examined 124 boys and 163 girls from the child study clinic, for timing and sequence of permanent teeth in Oregon and found more variability in girls in age of eruption than in boys, and eruption is generally earlier in girls and degree of variation in sequences of eruption of first seven permanent teeth is distinct <sup>(81)</sup>.

Ali and Odhiambo (1982) calculated the median age and 10<sup>th</sup> to 90<sup>th</sup> percentile range of age for a given number of teeth in a previously obtained cross-sectional study of 2847 African and Asian school children in age group of 4-14 years in Nairobi, Kenya. They found that up to the time of eruption of 2<sup>nd</sup> molars, the total number of permanent teeth erupted can be used to estimate the age of a child with an error which increases with the number of teeth present. This period for calculating age is limited and is up to 5 to 13 years. According to them, range of error is about 18-30 percent of the median age for African males and 21 to 29 percent for African females and range of error for Asian males was 15-33 percent and for Asian females is 18-33 percent. The exceeding of the limit of range of error is 1 in 5 chances <sup>(2)</sup>.

Jaswal (1983) examined 1263 Khasi children (615 males and 648 females) aged between 5 to 15 years for the emergence of permanent teeth. He recorded the gingival emergence of first twenty-eight and to compute the mean emergence time of each individual tooth and the collected data were subject to probit analysis. He found markedly earlier tooth emergence in females than males and canines were most advanced in this respect. Females acquired all their teeth in shorter time span (5.5 years) than males (6.5 years). Sex differences in the sequence of tooth emergence and between antimeres were insignificant. The Khasis showed earlier eruption when compared with other populations <sup>(38)</sup>.

Hoffding et al (1984) studied 1819 school children aged 6-15 year for emergence of permanent teeth and onset of dental stages in Japanese children. The results demonstrate specific frequencies of emergence in the two arches and earlier emergence times in girls than in boys. They also revealed earlier mean times of emergence in general in contemporary Japanese <sup>(32)</sup>.

Hag and Taranger (1985) collected data on the twenty deciduous teeth and first twenty nine permanent teeth in a randomly selected 212 urban Swedish children, who were followed from birth to eighteen years of age and found sex difference in the emergence of deciduous teeth is less than one month. Boys were ahead of girls until the 17th deciduous tooth. From here on, through most of the permanent dentition, girls are consistently ahead of boys. In the permanent dentition sex difference ranges from 3 months to 11 months <sup>(28)</sup>.

Hassanali (1985) studied on eruption of third permanent molar tooth on 1343 African and 1092 Asian students aged 13-23 years in Nairobi, Kenya and found emergence of third molar is earlier in African than in Asians. In African, mandibular third molars emerge at 17.6-18.3 years and maxillary at 18.5 to 18.9 years, while in Asians mandibular third molars emerged at 19.9-20.3 years and maxillary at 20.7 to 21.0 years. In African females, median age of eruption of third molar was 0.3 to 0.4 years earlier than in males. While in Asian females, eruption of

third molar was later by 0.3 years than in males. Earliest emergence of third molar in Africans is at 13 years and in Asians at 15 years <sup>(30)</sup>.

Hagg and Taranger (1986) collected data from 212 randomly selected Swedish urban children from birth to eighteen years. All deciduous teeth except the mandibular second molar emerged earlier in boys than in girls and all permanent teeth emerged earlier in girls than in boys <sup>(29)</sup>.

Ghai (1987) has described that the permanent teeth eruption starts at six years with the eruption of first molar, behind the 2nd temporary molar, central and lateral incisors at 7-8 years, canines and premolars at 9-13 years, 2nd molars at 12 years and 3rd molars at 18 years or even later <sup>(22)</sup>.

Muniz (1988) performed investigation on a cross sectional sample of 4735 randomly selected Caucasian and Amerindian children from 10 geographic regions of Argentina. Mean ages of eruption were computed using probit procedure, except 3<sup>rd</sup> molar. Mean times of eruption of permanent teeth showed no difference between two ethnic groups and in both samples all teeth emerged earlier in girls .

Blankenstein et al (1990) examined a total of 1036 Indian children in Johannesburg, South Africa in the Department of Conservative Dentistry, University of Witwatersrand to find out the mean ages of eruption for the 1<sup>st</sup> permanent molars and the permanent central and

lateral incisors. Earlier age of eruption for any permanent tooth was to be five years for girls and 4.94 for boys. Maxillary teeth erupted later than the mandibular teeth. Teeth in females erupted between one and six months earlier than in males. They also found that Indian children's teeth erupt 3.5-7 months later than those of black children <sup>(8)</sup>.

Mishra et al (1991) studied on 1424 subject (778 males and 646 females) from various schools and colleges in Himachal Pradesh between 13-25 years of age. Bonafide residents of Himachal Pradesh from the last three generations with sound health, whose date of birth could be verified from school records, hospital records, panchyat register, parents and horoscopes. Dental recording was done in the form of number of teeth erupted, missed teeth, presence of space for third molar. Dental charting was done according to Federation Dentaire Internationale system. They concluded that maximum frequency for spacing in lower jaw was found at 17.5 years and about 90% cases showed spacing between 15 to 21 years and about 93% cases showed spacing in same age group. In females, maximum frequency for spacing in both jaws was found at 17.5 years and about 87% cases showed spacing between 14 to 20 years in lower jaw and about 80% cases in upper jaw in the same age group <sup>(59)</sup>.

Pahkala, Pahkala and Laine (1991) collected data on permanent teeth eruption by examining individuals aged between 5-15 years in Finland in a total of 1008 subjects (483 girls and 525 boys) and found

significant difference between the girls and boys in timing of eruption of some permanent teeth indicating earlier eruption in girls than in boys <sup>(68)</sup>.

Chhokar, Aggarwal and Bhardwaj (1992) estimated age in females by dental and radiological examination. They studied 200 female students between 14 to 18 years of age. Total number of teeth present were counted, third molar erupted or space formation present was noted and antero-posterior views of respective joints were taken. According to them eruption of third molar was present in 10% cases by 15 years of age, in 30% cases by 16 years of age, in 56% cases by 17 years of age and in 80% cases by 18 years of age <sup>(14)</sup>.

Rmirez, Planells and Barberia (1994) studied eruption of 114 Spanish children in two primary care centers over three years and found non-significant tendency towards earlier left side eruption and a significant earlier mandibular eruption for central incisors and second molars and a significant earlier maxillary eruption for lateral incisors and a tendency towards earlier eruption in boys for all teeth <sup>(74)</sup>.

Virtanen, Bioigu and Larmas (1994) studied 911 children living in three rural communities for the timing of Eruption of permanent teeth in standard Finnish patient documents and found that the means and standard deviations are in line with previous results. The sex differences in emergence timing ranged from 0.1 to 1.0 years for various teeth <sup>(98)</sup>.



Elmes and Dykes (1997) examined 493 children (255 boys and 238 girls) in the Colchester area of England for one calendar month. Their mean age was 6.48 years within a range of 4.49 - 8.75 years. They found that 164 children had no permanent teeth, leaving 329 children with a total of 2238 permanent teeth. They found no significant difference of the emergence of permanent central Incisor and permanent first molars. Lower central incisors emerge earlier than upper central incisors and no significant differences was there in the emergence times of upper and lower permanent first molars and also there was no significant difference of emergence times of permanent central incisor for boys and girls and emergence times of permanent molars for boys and girls earlier than the corresponding maxillary teeth <sup>(19)</sup>.

Eskeli et al (1999) examined 1008 eastern and 569 Western Finnish children aged 5 to 16 years for tooth emergence and regional variation. They found no regional variation in permanent eruption. Median ages of eruption were different for girls and boys <sup>(20)</sup>.

Jain (1999) studied on 146 cases of boys and girls of different Schools and Colleges in Jaipur city. Only those cases were selected for the study whose date of birth was verified by their school or college authorities. These subjects were examined clinically for height, weight, general body development and number of teeth. He found that the number of teeth will not exceed 28 at the age of 17 years in both sexes. The 3rd

molar tooth appears at any time between the age group of 17-25 years of age in both sexes <sup>(37)</sup>.

Pathak et al (1999) estimated age of an individual from developmental stages of third molar teeth. The study was conducted on 174 cases of either sex having age between 13-25 years. After clinical examination, each person was X-rayed. He found that socio-economic status had no effect on eruption and development of various stages of third molar teeth <sup>(70)</sup>.

Rao (2000) has given that the permanent dentition begins at sixth year and by twelve to fourteen years, second molar erupts. The eruption of third molar is between seventeen to twenty – five years of age <sup>(76)</sup>.

Nystrom et al (2001) studied on emergence of permanent teeth except third molar on 187 Finnish children in Finland and found that mandibular central incisor emerged before the first molar of the same jaw in 68% of the children. They also observed that tooth counts can be used in maturity estimations up to 13 years of age, where as radio graphic method works best to about 11 years <sup>(65)</sup>.

Sharma and Mittal (2001) studied patterns of secondary tooth eruption in Gujjars in a cross sectional samples of 483 between 6 to 13 years of age. They observed, female tooth emerges earlier than males but in the sequence of emergence, there were no sex differences. Emergence time difference between median right and left sides was only 14.29%

namely central incisors, mandibular 1st molars, in males and lateral maxillary incisors in females. In general, mandibular teeth except premolar tend to emerge earlier than their maxillary counterparts. They noted the longer quiescent period between 1st and 2nd tooth emergence in males than in females and mandibular depth and morphological facial length were related significantly to number of teeth present in the oral cavity <sup>(83)</sup>.

Subrahmanyam (2001) described that permanent teeth erupt at first in the lower jaw and then in the upper jaw. They appear a few months earlier in girls than in boys. The time of eruption of 3rd molar is very uncertain <sup>(89)</sup>.

Ilieva, Veleganova and Belcheva (2002) conducted study on 928 children from four to eight years of age in Plovdiv for the eruption of first permanent molars from randomly selected, kindergartens and schools and found no statistically significant difference in the eruption age of first permanent molars between two genders, as well as between the upper and lower jaw. They also found the initial eruption age of first permanent molars is five to six years, the mean age is six to seven years and the latest age is seven to eight years <sup>(35)</sup>.

Mesotten et al (2002) studied orthopantomograms of 1175 patients of Caucasian origin between 16 and 22 years of age (498 males and 677 females) and found earlier development of 3rd molar in males compared

to females and showed earlier development of 3rd molar in the maxilla compared to the mandible<sup>(58)</sup>.

Mugonzibwa et al (2002) investigated the emergence of permanent teeth among Tanzanian children in a population of 869 (428 males and 441 females) in 16 schools in age groups of 3.5-5.0, 6.5-8.0, 9.5-11.0 and 15-16 years. Hence concluded their study that the permanent teeth of Tanzanian children erupt earlier in girls than in boys and the mandibular teeth erupt earlier than the corresponding maxillary teeth. Also, permanent teeth in Tanzanians children clearly emerge earlier than in Caucasian children<sup>(62)</sup>.

Korhonen and Larmas (2003) in a study on 1910 children for dental age and dental health determined longitudinally from patient records in three towns in Finland and found earlier eruption in girls than in boys<sup>(42)</sup>.

Leroy et al (2003) after studying 4468 Flemish children indicated significantly earlier emergence in girls than in boys and emergence pattern turned out to be symmetric in both sexes. Most mandibular teeth emerged significantly before their antagonists, in boys as well as in girls and findings are in agreement with the other studies on eruption<sup>(50)</sup>.

Nizam, Naing and Mokhtar (2003) examined 2832 subjects (1062 boys and 1320 girls) in Kelanthan, Malaysia to determine age and sequence of eruption of permanent teeth, as well as gender difference in

age group of 5-17 years. They found that mean age of eruption of lower first molar was six years. The median age of eruption of tooth was earlier in girls than in boys. All mandibular teeth with the exception of first and second premolars in both sexes, tends to erupt earlier than their maxillary counter parts <sup>(64)</sup>.

Rajendran, Daniel T (2003) a study done on permanent tooth eruption in mixed dentition period in 963 School children, 494 females and 469 males from the age group of 4 to 14.5years. The study shows eruption of mean age group with standard deviation is as follows, first molar  $6.4 \pm 0.97$ , permanent central incisor  $6.7 \pm 1.19$ yrs, Permanent lateral incisor  $6.97 \pm 1.43$ yrs, first premolar  $9.96 \pm 1.92$  years, Second premolar  $11.10 \pm 1.37$ yrs, permanent canine  $11.42 \pm 1.25$ yrs and permanent second molar  $11.21 \pm 1.44$ yrs <sup>(56)</sup>.

Subrahmanyam (2004) described that eruption of permanent teeth starts at the age of six years, by eruption of first permanent molar, behind the second temporary molar and by age of twelve to thirteen years, all permanent teeth erupts, with the exception of wisdom tooth (3<sup>rd</sup> molar) whose eruption is most erratic and is between seventeen to twenty-five years of age. Mixed dentition exists between six to fourteen years of age.

Chaurasia (2004) concluded that the permanent teeth eruption starts in the form of first molar at six years. At seven years median incisors, at eight years lateral incisors, at nine years first premolars, at ten years second premolars, eleven years canines and at twelve years second molars. The eruption of third molar is at 17-25 years or even later <sup>(13)</sup>.

Kuldeep singh et al (2005) described the permanent teeth Molar1, Central incisor, Lateral incisor, Premolar 1, Premolar 2, Canine, Molar – 2 and Molar - 3 were erupted in 5.81 to 7.91 years, 6.8 to 8.71 years, 7.64 to 9.98 years, 9.28 to 11.20 years, 10.01 to 11.36 years, 10.61 to 11.96 years, 11.94 to 14.14 years and 17.02 to 24.96 years respectively. Eruption of permanent teeth was earlier in mandible than their maxillary counterparts <sup>(45)</sup>.

Guharaj.P, Chandran M.R.(2009) stated that the ages of eruption of permanent teeth is as follows, first Molar 6 yrs, central incisor 7 - 8 yrs, lateral incisor 8 - 9 yrs, canine 11 - 12 yrs, first pre molar 9 - 11 yrs, second pre molar 10 - 12 yrs, second molar 12 - 14 yrs and third molar 17 - 25 yrs. There is great uncertainty regarding the eruption of third molar. In some case it appear very late in life <sup>(27)</sup>.

Lyon's (2010) described that permanent teeth start appearing and replacing temporary teeth from the age of six years. All permanent teeth except molar teeth are known as successional permanent teeth for these reason, the molar teeth are known as super added teeth. The sequence of

eruption of permanent teeth is as follows: First molar 6 years, central incisor 7 years, lateral incisor 8 years, first premolar 9 years, canine 11 years, second molar 12 years and third molar 18 to 24 years. Generally, the mandibular teeth appear earlier, thus the lower canine may appear as early as 9 years, the lower first premolar at 10 years, lower second premolar at 11 years <sup>(53)</sup>.

Modi's (2010) describes the average period of eruption of permanent teeth as follows central incisor 6 – 8yrs, lateral incisors 7 – 9yrs, canines 11 – 12yrs, anterior pre molar or first bicuspid 9 – 11yrs, post premolars or second bicuspid 10 – 12yrs, first molars 6 – 7yrs, second molars 12 – 14yrs and Third molars or wisdom teeth 17 – 25yrs.

The permanent teeth erupt initially in the lower jaw and after short intervals in the upper jaw but are not always regular in their appearance. On an average, they appear a few months earlier in girls than in boys. In few cases, they may appear earlier than the average period. The time of eruption of third molar tooth or wisdom teeth is more uncertain and it may also be impacted. These teeth are usually cut between 17 and 26yrs of age <sup>(56)</sup>.

Parikh (2010) described the permanent teeth appear first in the lower jaw than in the upper jaw. The first molar appears at about the sixth year and the second molar at about the twelfth year. The eruption of third molar is very irregular. Thus after twelve years space for the last molar

should be looked for. The presence of four wisdom teeth usually means that the subject has passed the age of seventeen years <sup>(69)</sup>.

Apurba nandy (2010) describes chronological appearance of permanent teeth are as follow. First molar 6 years, central incisor (both upper and lower jaw) 7yr, lateral incisors (both upper and lower jaw) 8yr, first premolar 9<sup>th</sup> yr, second premolars 10<sup>th</sup> year, canine 11<sup>th</sup> yr, second permanent molar 12 to 14 years, third permanent molar 17 to 25 years or later or may not erupt at all. It must be remembered that the diseases and nutritional deficiency states may delay eruption of teeth. Similarly, there may be premature eruption of teeth. The author studied eruption of teeth pattern in about 2000 boys and girls. During the study it was observed that there is a wide range of variation in eruption of teeth. In some children it was observed that some or even all permanent second molars were erupted though one or two premolars and permanent canine did not erupt, yet replacing temporary molars and temporary canines <sup>(3)</sup>.

Ajay Kumar (2011) described that the permanent teeth are 32 in numbers and begin to replace the temporary teeth in the 6<sup>th</sup> year of age. It is usually complete by the 24<sup>th</sup> year. The last permanent tooth to erupt is the third molar also called as wisdom teeth. Eruption of permanent teeth are first molars, central incisors, lateral incisors, first pre molars, second premolars, canines, second molars and third molars at 6 years, 7 years, 8 years, 9 years, 10 years, 11 years, 12 years, 18 to 24 years respectively. In



both temporary and permanent teeth, dentition occurs earlier in lower jaw except for the lateral incisors which erupt earlier in the upper jaw. The difference in the appearance of lower and upper jaw teeth is about few months <sup>(1)</sup>.

Reddy K.S.N (2011) described that temporary teeth are twenty in number. In weak children and in rickets, dentition may be delayed, while in syphilis, teeth may be premature or even present at birth. The temporary teeth commence to shed about sixth or seventh year, after the eruption of permanent 1<sup>st</sup> molar teeth, behind the second temporary molars. At the age of nine, twelve permanent teeth are in mouth (8 incisors and 4 molars). At the age of eleven, there are twenty permanent teeth and at fourteen, there are twenty - eight permanent teeth.

The permanent teeth erupted were central incisor 6 to 8 years, lateral incisor 7 to 9 years, canine 11 to 12 years, first premolar 9 to 11 years, second premolar 10 to 12 years, first molar 6 to 7 years, second molar 12 to 14 years, third molar 17 to 25 years. In both deciduous and permanent teeth, dentition occurs earlier in lower jaw except for the lateral incisors which erupts earlier in upper jaw. Wisdom tooth first erupts in lower and on the left side and then on the right side. The number and eruption of deciduous teeth is more regular than the permanent dentition. Tooth eruption in females may be one year earlier than that of males. From fourteen to twenty years, dental age estimation is based upon

the stage of development of third molar and root formation of second molar. If the third molar is absent the space should be looked in the jaw behind the second molar teeth. If the third molars are fully erupted it indicates that an individual is at least seventeen years of age <sup>(77)</sup>.

Vij (2011) according to him the permanent teeth erupt first in the lower jaw and then in the upper jaw. The permanent teeth appear a few months earlier in girls than in boys. The eruption of third molar tooth which is very irregular usually erupts by 17 - 25 years of age <sup>(97)</sup>.

Umadethan.B (2011) described that first permanent tooth to appear is first molar behind the temporary second molar at the age of 6 - 7 yrs. This is followed by central incisors at the age of 7 - 8 yrs, and then lateral incisors at the age of 8 - 9 yrs. The next teeth to appear are the first pre molars at 9 - 11 yrs, canine appear at the age of 11 - 12 yrs. Recent study show that canine erupts before the second pre molar (Krishnan.B) at 10 - 12 yrs. Second molars appear by 12 - 14 yrs. At 14 yrs, there will be 28 permanent teeth, 14 in each jaw. Usually, the third molar erupts between 17 - 25 yrs. Sometimes the eruption may be as late as 30 yrs, rarely, may not erupt at all.

There is much variation in the chronological eruption of teeth. Therefore, accurate estimation of age is not possible based on dental data alone. If third molar is fully erupted, age can be estimated as 17 yrs. After eruption, it takes 3 years for calcification of the entire root. If third molar

is not erupted, age can be assessed as below 25-30 yrs. But this may not be correct estimation as the eruption is highly variable <sup>(96)</sup>.

## **MATERIAL AND METHODS**

This study comprises of 1000 subjects from both sexes (554 boys and 446 girls) from 6 years to 25 years of age. Quite a larger number of subjects are selected to reduce errors in statistical analysis. Age group selected for this study is from 6 years to 25 years of both sexes, as permanent dentition occurs between 6 years to 25 years.

The subjects are selected from Schools and Colleges in Tirunelveli District. Tirunelveli is called as Oxford of South India, having many Residential Schools, Private Schools, Government aided Schools and Government Schools. Children from high socioeconomic status are studying in Residential schools and private Schools where as Children from middle socioeconomic status prefer Government aided Schools and children from poor socioeconomic status prefer Government Schools.

As nutritional status is having an influence over eruption of permanent teeth, I felt it is better to do this study in balanced, nutritional children. So, I opted to select samples from Government aided Schools.

Educational institutions are mainly opted for this study because of reliable or valid records regarding the subject`s age, easiness in collecting more samples in a single area and accessible place for conducting oral examination of subjects in a large scale.

Subjects are divided according to their completed months of age as completed 72months, 84months, 96months, 108months, 120months, 132months, 144months, 156months, 168months, 204months, 216months, 228months, 240months, 252months, 264months, 276months, 288months and 300months.

For conducting examination of subjects, I obtained permission from Headmasters in Schools and Heads of the Institution in Colleges.

**Study design:** cross sectional study.

**Period of study:** March 2011 to June 2012.

**Inclusion criteria:**

1. Subjects having a valid date of birth record in the form of birth certificate issued by the Local Government authorities or identity cards issued by the concerned Schools and colleges based upon birth certificates or driving licenses.

2. Moderately nourished appearance of the subjects.

**Exclusion criteria:**

1. Malnutrition either under or over.
2. Congenital anomalies.
3. Supernumerary teeth.
4. Poor oral hygiene such as dental caries.

**Methods:**

For assessing dental eruption, two ways of examination are routinely followed. They are clinical oral examination and X-ray examination.

Out of this, naked eye clinical oral examination is opted, as it is easy, simple and non invasive. In x-ray examination, its invasiveness, expenses and radiation hazards to the growing children and young are its major adverse effects.

For conducting study, a proforma is prepared to collect all relevant information like age, sex, Father's name, socio economic status, dietary habits, general physical examination like built, height in cm from the subjects.

**Age estimation record from 6 years to 25 years aged  
individuals**

Sl. No.

Date:

1. Name :

2. Date of birth from

School Register :

Birth Certificate :

3. Father's / Mother's Name :

4. Sex :

5. Address :

6. Occupation :

7. Married / Unmarried :

8. General Physical Examination :

a. Built – Poor / Moderate / Well

Nourishment – Poor / Moderated / Well

b. Height in Cm

9. Modified F.D.I (Federation Dentaire Internationale) system.

### For Temporary Teeth

Right upper jaw	Left upper jaw
55 54 53 52 51	61 62 63 64 65
75 74 73 72 71	81 82 83 84 85
Right lower jaw	Left lower jaw

### For Permanent Teeth

Right upper jaw	Left upper jaw
18 17 16 15 14 13 12 11	21 22 23 24 25 26 27 28
38 37 36 35 34 33 32 31	41 42 43 44 45 46 47 48
Right lower jaw	Left lower jaw



10. Consent: I \_\_\_\_\_ S/o, D/o  
\_\_\_\_\_ have no objection for using these findings,  
photographs for presenting / publishing for research purposes.

Signature of the Student / Guardian.

Signature of the examiner.

### **Master Chart from 6 years to 25 years**

SI.No.	Name of Subject	Sex	Alleged Age	Estimated Age

Dental eruption examination in subjects was studied through dental camps conducted about oral hygiene in various Schools and College after obtaining proper permission. The camp is conducted during working days and at morning time. Along with me, a qualified Dentist, a female assistant with enough knowledge to fill the details obtained, in the proforma and a nursing assistant are also included in the camp. Children and young students were given a short informative session about oral hygiene regarding how to brush, the amount of toothpaste to be used while brushing, essential ingredients to be present while selecting toothpaste, number of times brushing to be done and maintaining oral hygiene. They are further encouraged by giving a sample toothpaste and a brush.

The subjects were examined after informed consent obtained from Head masters and or from subjects depends upon their age. The oral cavity is examined with the help of a torch light and a dental mirror with mouth wide open using a tongue depressor. Detailed dental examination is done and details noted in the form of number of teeth erupted and stage of eruption. The information regarding eruption of teeth is directly entered into a master chart. To find out the space formation for third molar or eruption of third molar, I used a mirror and palpated for hardening of space behind second molar. Dental charting is done

according to Modified F.D.I (Federation Dentaire Internationale) system as follows.

### For Temporary Teeth

Right upper jaw	Left upper jaw
55 54 53 52 51	61 62 63 64 65
75 74 73 72 71	81 82 83 84 85
Right lower jaw	Left lower jaw

### For Permanent Teeth

Right upper jaw	Left upper jaw
18 17 16 15 14 13 12 11	21 22 23 24 25 26 27 28
38 37 36 35 34 33 32 31	41 42 43 44 45 46 47 48
Right lower jaw	Left lower jaw

The stages of tooth eruption are done in the following manner <sup>(100)</sup>.

**Stage 0:**

Fall out of primary tooth and non eruption of corresponding permanent tooth.

**Stage 1:**

When tip of crown of tooth, penetrates the gum margin (positive clinical eruption).

**Stage 2:**

When crown has grown into oral cavity beyond gum margins but not yet reached the occlusal plane.

**Stage 3:**

When the occlusal surface is in contact with its counterpart and the bite is complete.

In my study, Stage 0 was considered as not erupted, Stage 1 & 2 were considered as not completely erupted and Stage 3 as erupted.

The Statistical procedures were performed by the statistical package namely PASW (predictive and analysis software) and statistics - 18 (so called SP18).

The Z test of property derived from the following formulae:

$$Z = \frac{P_1 - P_2}{SE_{P_1 \& P_2}}$$

$$SE_{P_1 \& P_2} = \sqrt{\frac{p_1 q_1}{n_1} + \frac{p_2 q_2}{n_2}}$$

$P_1, P_2$  - Probability of two samples.

$p$  - Probability occurrence in one trial.

$q$  - Probability of non occurrence of same trial.

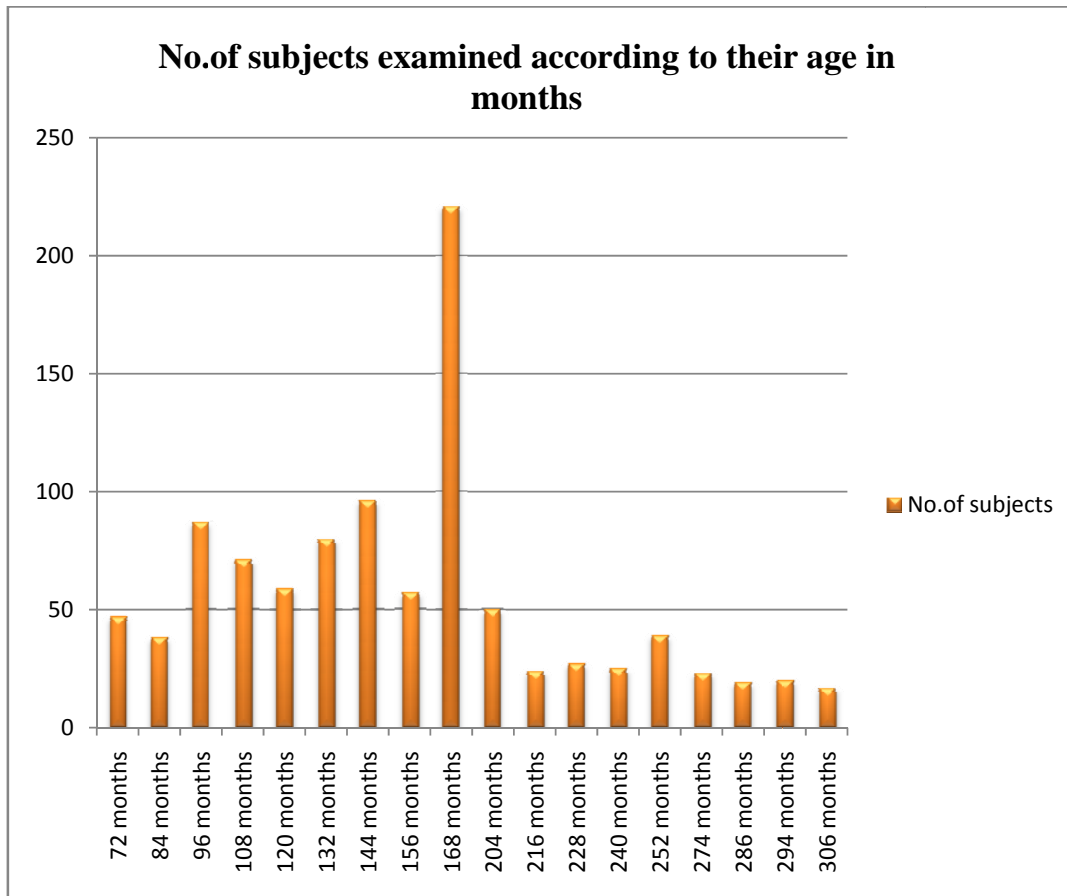
$n$  - Number of trials.

$SE$  - Standard Error.

**Table-1****Total number of subject examined**

<b>S.NO</b>	<b>AGE IN MONTHS</b>	<b>MALE</b>	<b>FEMALE</b>	<b>BOTH MALE &amp; FEMALES</b>
1	Completed 72 months	25	22	47
2	Completed 84 months	23	15	38
3	Completed 96 months	45	42	87
4	Completed 108 months	42	29	71
5	Completed 120 months	27	32	59
6	Completed 132 months	50	30	80
7	Completed 144 months	54	42	96
8	Completed 156 months	31	26	57
9	Completed 168 months	126	95	221
10	Completed 204 months	27	23	50
11	Completed 216 months	11	13	24
12	Completed 228 months	15	12	27
13	Completed 240 months	13	12	25
14	Completed 252 months	16	23	39
15	Completed 264 months	15	08	23
16	Completed 276 months	12	07	19
17	Completed 288 months	11	09	20
18	Completed 300 months	11	06	17
	Total	554	446	1000

**Chart-1**



### **STATISTICAL ANALYSIS:**

The study subjects were analysed and described according to their status of eruption of permanent teeth by percentage distribution. The comparison of complete eruption between jaws and between sides were analyzed and interpreted by 'Z' test of properties.

The age of the subjects according to the complete eruption of the teeth at particular jaw was analyzed and estimated at 95% of confidence interval by explore method. The male and female samples were analyzed teeth wise and interpreted by 'student's independent "t" test. The above statistical procedures were performed by the statistical percentage namely PASW (Predictive and Analysis Software) statistics – 18 (The so called SP 18). The P value < 0.05 was considered as significant under two tailed conditions.

## **RESULTS AND OBSERVATIONS:**

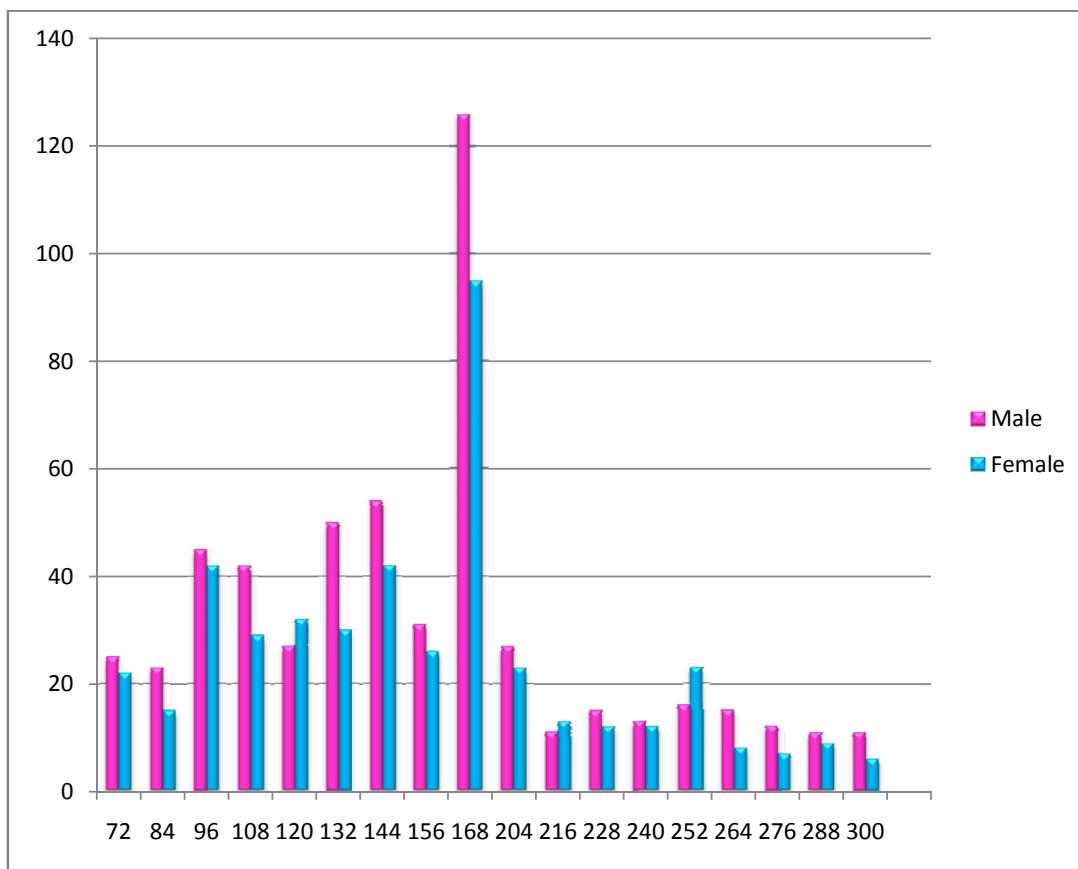
### **Description of clinical trials:**

I took 1000 random subjects from different Schools and Colleges of Tirunelveli District, out of these 554 were male and 446 were female (Table - 1). The data collection was conducted during the period of June 2011 to January 2012(Chart-1, 2.). The study was described in terms of completely erupted (CE), Not Completely Erupted (NCE) and Not Erupted (NE). The types of teeth are molar 1, central incisor, lateral incisor, premolar 1, premolar 2, canine, molar 2 and molar 3.



**Chart-2**

**Total number of male and female examined (Age in months)**



**Table: 2**

**Description of study subjects according to the eruption status and  
sites of teeth**

Sl. No.	Teeth	Side of Teeth	Status of eruption						
			completely erupted		Not completely erupted		Not erupted		Total
			No's	Percentage	No's	Percentage	No's	Percentage	
1	Molar – 1 (72months)	Right Upper	42	89.4	5	10.6	0	-	47
		Left Upper	42	89.4	4	8.5	1	2.1	47
		Right Lower	42	89.4	5	10.6	0	-	47
		Left Lower	42	89.4	5	10.6	0	-	47
2	Central Incisor (96months)	Right Upper	74	89.2	8	9.6	1	1.2	83
		Left Upper	77	92.8	5	6	1	1.2	83
		Right Lower	73	88	10	12	0	-	83
		Left Lower	77	92.8	6	7.2	0	-	83
3	Lateral Incisor (108months)	Right Upper	154	97.5	3	1.9	1	0.6	158
		Left Upper	155	98.1	3	1.9	0	-	158
		Right Lower	158	100	0	-	0	-	158
		Left Lower	158	100	0	-	0	-	158
4	Pre Molar – 1 (132months)	Right Upper	175	80.7	32	14.7	10	4.6	217
		Left Upper	183	84.3	24	11.1	10	4.6	217
		Right Lower	197	90.9	14	6.4	6	2.7	217
		Left Lower	210	96.8	7	3.2	0	-	217
5	Pre Molar – 2 (144months)	Right Upper	122	87.8	12	8.6	5	3.6	139
		Left Upper	122	87.8	12	8.6	5	3.6	139
		Right Lower	131	94.2	5	3.6	3	2.2	139
		Left Lower	133	95.7	5	3.6	1	0.7	139
6	Canine (144months)	Right Upper	158	89.8	12	6.8	6	3.4	176

		Left Upper	159	90.3	13	7.4	4	2.3	176
		Right Lower	171	97.2	5	2.8	0	-	176
		Left Lower	172	97.7	4	2.3	0	-	176
7	Molar – 2 (168months)	Right Upper	250	66.8	36	9.6	88	23.5	374
		Left Upper	239	63.9	56	15	79	21.1	374
		Right Lower	276	73.8	51	13.6	47	12.6	374
		Left Lower	293	78.4	33	8.8	48	12.8	374
8	Molar – 3 (306months)	Right Upper	85	34.7	74	30.2	86	35.1	245
		Left Upper	111	45.3	54	22	80	32.7	245
		Right Lower	107	43.7	56	22.9	82	33.4	245
		Left lower	113	46.1	58	23.7	74	30.2	245

Table 2 describes the percentage of distribution of subjects participated in the study in respect to their teeth eruption status, such as completely erupted age brackets.

**Molar 1 teeth** completely erupted in 90% of subjects in all jaws at expected age (72 months) and not completely erupted and not erupted subjects were negligible.

**Central Incisor teeth** completely erupted in 90% of subjects in all jaws at expected age (96 months) group and not completely erupted and not erupted subjects were negligible.

**Lateral Incisor teeth** 98 to 100 % of subjects had complete eruption in all jaws at expected age (108 months) group and not completely erupted and not erupted subjects were negligible.

**Pre Molar 1** of right upper and left upper jaws was completely erupted in 80.7% and 84.3% of subjects respectively. The same of right lower and

left lower jaws were 90.95 % and 96.85% respectively at expected age group.

**Pre Molar 2** completely erupted in 87.7% of subjects in both upper jaws and eruption in right and left lower jaws were 94.2% and 95.2% in subjects respectively at expected age group.

**Canine** teeth of right and left upper jaws were completely erupted in 89.8% and 90.3% respectively. The same lower jaw teeth were 97.2 % and 97.7% respectively at expected age group and not completely erupted and not erupted subjects were negligible.

**Molar 2** of right and left upper jaw were completely erupted in 66.8% and 63.9 % respectively. The same right and left lower jaw teeth were 73.8% and 78.4% respectively at expected age group.

**In Molar 3** teeth, complete eruption in right and left upper quadrant were 34.7% and 45.3% respectively and the same in right and left lower quadrant were 43.7% and 46.1% respectively at expected age group.

**Comparison of complete eruption teeth between quadrants and sides:**

The complete eruption of teeth between the right and left sides of upper and lower quadrant were compared.

The complete eruption of teeth between the upper and lower quadrants of right and left sides were compared in the following tables (tables 3, 4).

**Table: 3**

**Comparison of complete eruption of teeth between right & left  
sides of upper and lower quadrants**

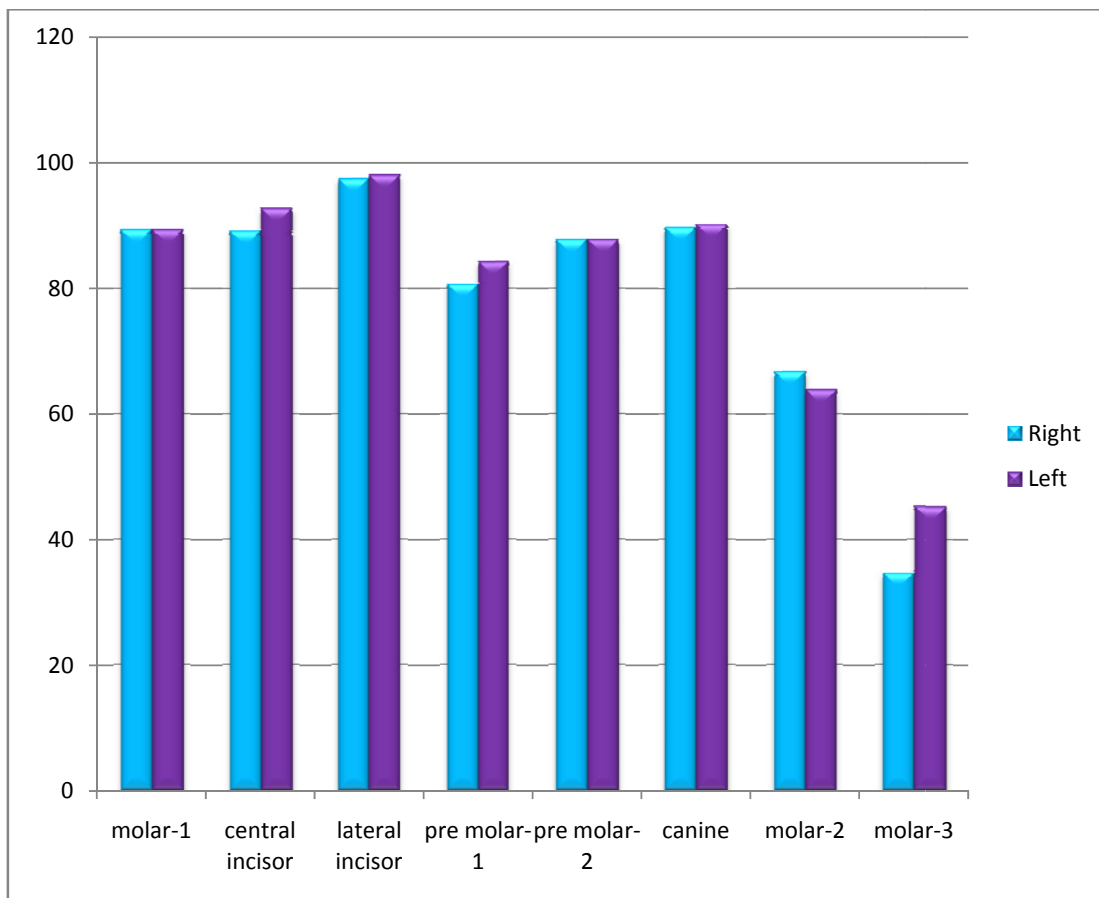
Teeth	UPPER QUADRANT				LOWER QUADRANT			
	Percentage of		" Z "	Significance	Percentage of		" Z "	Significance
	Right	Left			Right	Left		
Molar – 1	89.4	89.4	0.00	P = 1.00	89.4	89.4	0.00	P = 1.00
Central Incisor	89.2	92.8	0.773	P > 0.05	88.0	92.8	0.998	P > 0.05
Lateral Incisor	97.5	98.1	0.359	P > 0.05	100.0	100.0	0.00	P = 1.00
Pre Molar – 1	80.7	84.3	0.896	P > 0.05	90.9	96.8	2.477	P < 0.05
Pre Molar – 2	87.8	87.8	0.00	P = 1.00	94.2	95.7	0.557	P > 0.05
Canine	89.8	90.3	0.148	P > 0.05	97.2	97.7	0.303	P > 0.05
Molar – 2	66.8	63.9	0.674	P > 0.05	73.8	78.4	1.286	P > 0.05
Molar – 3	34.7	45.3	1.515	P > 0.05	43.7	46.1	0.358	P > 0.05

The comparisons between the complete eruption of right and left side teeth of the upper and lower quadrant shown in the above table – 3 revealed that there was no significant difference between them ( $P > 0.05$ ), except Pre Molar -1 in lower quadrant. Complete eruption of lower right

premolar – 1 teeth (90.9%) is significantly later than that of lower left pre molar – 1(96.8%), ( $p < 0.05$ ), (Chart-3, 4).

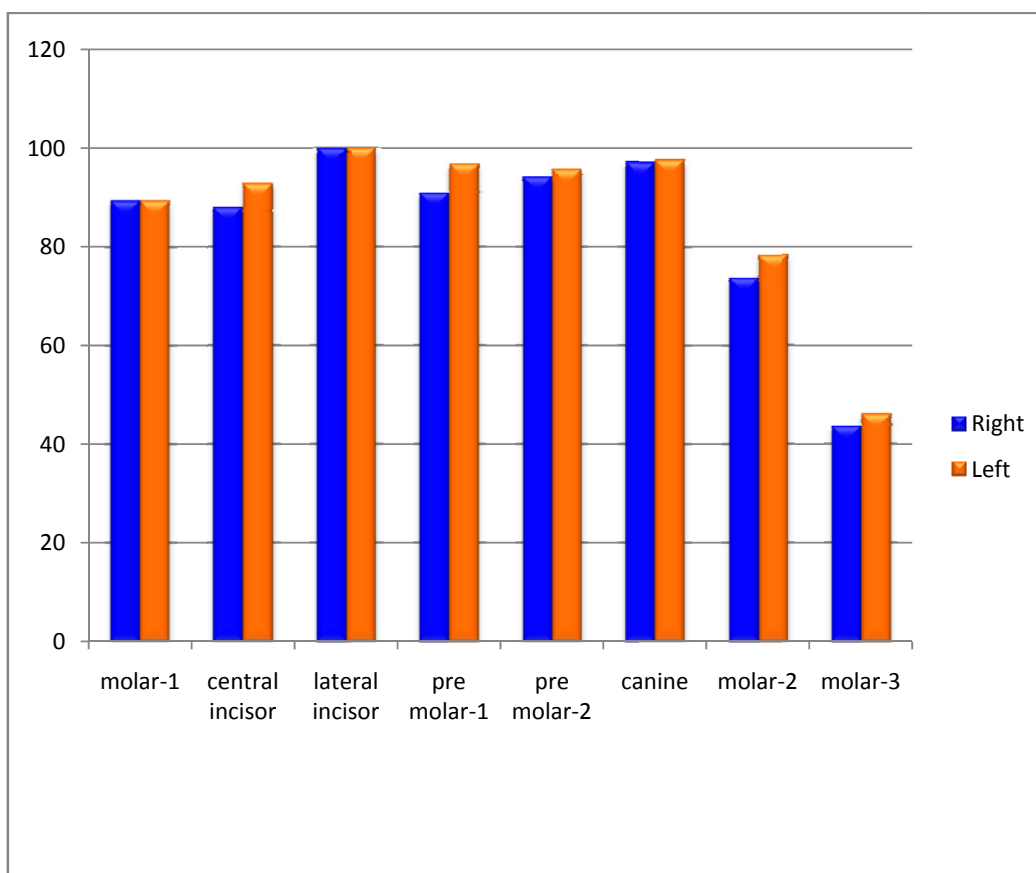
**Chart-3**

**Comparison of complete eruption of teeth between right and left side  
of upper quadrant**



**Chart-4**

**Comparison of complete eruption of teeth between right and  
left side of lower quadrant**



**Table – 4**

**Comparison of complete eruption of teeth between right and left  
sides of upper and lower quadrants**

Teeth	RIGHT SIDE				LEFT SIDE			
	Percentage of		" Z "	Significance	Percentage of		" Z "	Significance
	Upper quadrant	Lower quadrant			Upper quadrant	Lower quadrant		
Molar – 1	89.4	89.4	0.00	P = 1.00	89.4	89.4	0.00	P = 1.00
Central Incisor	89.2	88.0	0.229	P > 0.05	92.8	92.8	0.00	P = 1.00
Lateral Incisor	97.5	100.0	1.987	P < 0.05	98.1	100.0	1.733	P > 0.05
Pre Molar– 1	80.7	90.9	2.818	P < 0.01	84.3	96.8	4.236	P < 0.01
Pre Molar– 2	87.8	94.2	1.773	P > 0.05	87.8	95.7	2.286	P < 0.05
Canine	89.8	97.2	2.722	P < 0.01	90.3	97.7	2.834	P < 0.01
Molar – 2	66.8	73.8	1.757	P > 0.05	63.9	78.4	3.691	P < 0.001
Molar – 3	34.7	43.7	1.277	P > 0.05	45.3	46.1	0.169	P > 0.05

The above table – 4 compares the complete eruption of teeth between upper and lower quadrant of right and left side.

Complete eruption of right lower lateral incisor is earlier than other lateral incisors and it is statistically significant ( $P < 0.05$ ).



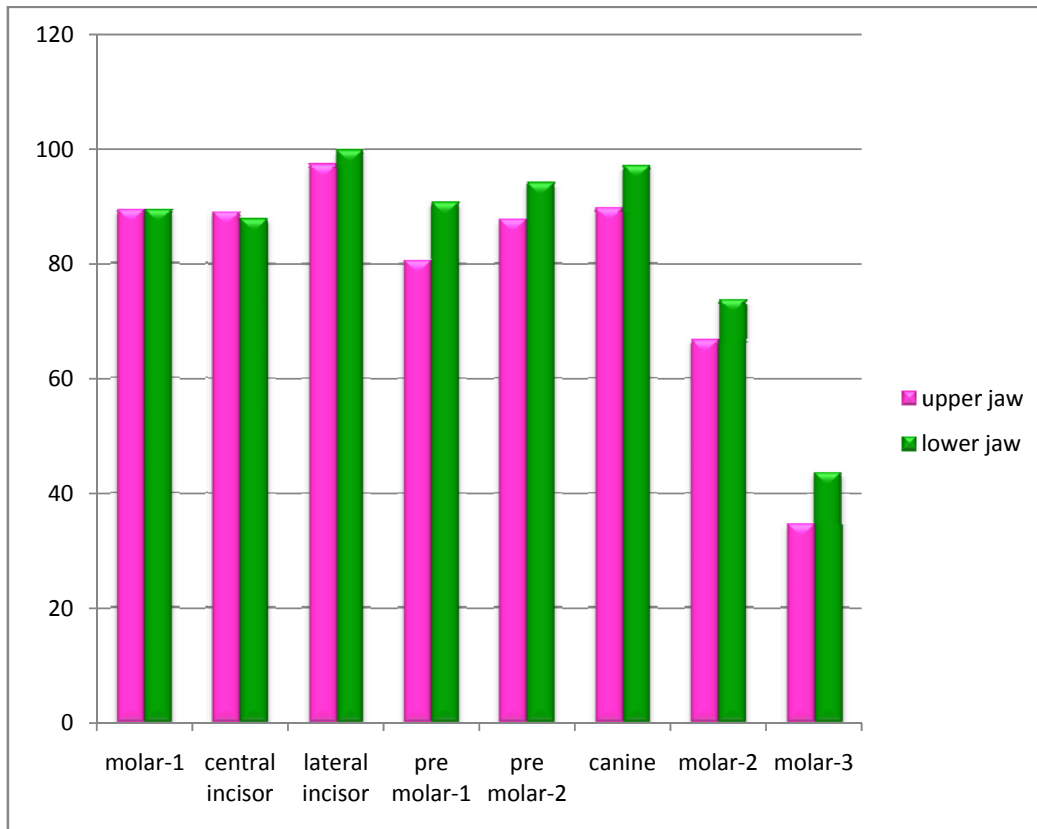
Complete eruption of right and left pre molar – 1 of lower quadrant is earlier than in upper quadrants and that is statistically highly significant ( $P < 0.01$ ).

Complete eruption of left lower pre molar - 2 is earlier than other pre molar – 2 and it is statistically significant ( $P < 0.05$ ).

Complete eruption of right and left canine of lower quadrants is earlier than in upper quadrant and that is statistically highly significant ( $P < 0.01$ ).

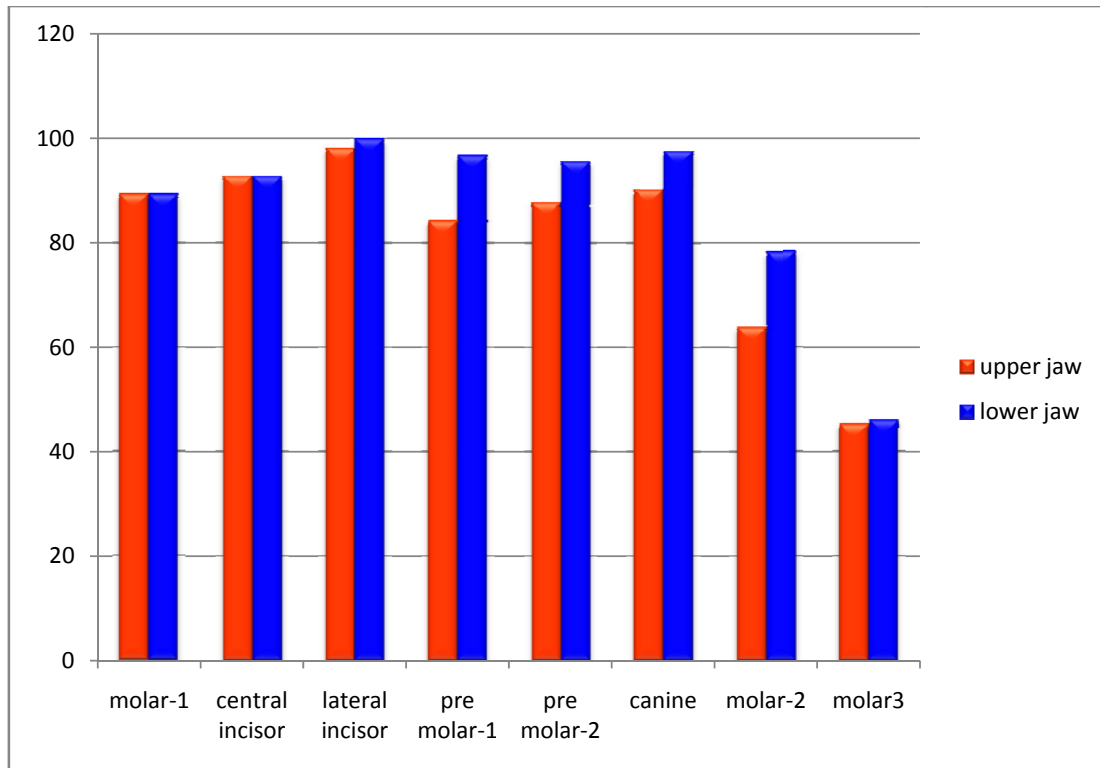
Complete eruption of left lower molar - 2 is earlier than other molar - 2 and it is statistically very highly significant ( $P < 0.001$ ), (Chart-5 6).

**Chart-5**  
**Complete eruption of teeth between upper and**  
**lower quadrant of right side**



**Chart-6**

**Complete eruption of teeth between upper and  
lower quadrants of left side**



**Age estimation of teeth according to the site:**

The age at complete eruption of teeth such as Molar – 1, Central incisor, Lateral incisor, Pre Molar – 1, Pre Molar – 2, Canine, Molar – 2 and Molar – 3 were estimated in each side of upper and lower quadrants. The estimated age were stated in months in the below mentioned tables.

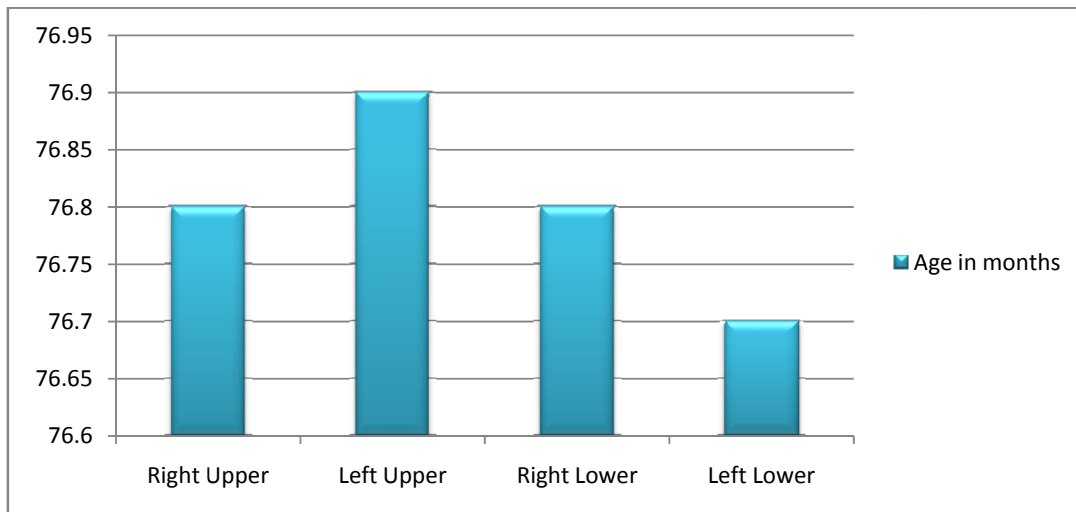
**Table – 5**

**Complete eruption of Molar – 1 at different sites (Age in months)**

Molar - 1	" n"	Age (Months)		Population Mean age estimated at 95% confidence interval (Age in months )
		Mean	S.D	
Right Upper	42	76.8	2.7	75.9 to 77.7
Left Upper	42	76.9	2.7	76.0 to 77.7
Right Lower	42	76.8	2.7	76.0 to 77.7
Left Lower	42	76.7	2.7	75.9 to 77.6

**Chart-7**

**Complete eruption of Molar –1 at different sites  
(Mean age in months)**



The complete eruption of Molar -1 was shown in the above table –

5. The Mean age of right upper was  $76.8 \pm 2.7$  months and the same was estimated in the population in between 75.9 to 77.7 months. Similarly, the mean age of left upper, right lower and left lower were in between  $76.9 \pm 2.7$ ,  $76.8 \pm 2.7$  and  $76.7 \pm 2.7$  respectively. The estimated population mean ages were in between 76.0 to 77.7, 76.0 to 77.7 and 75.9 to 77.6 months respectively at 95% confidence interval (chart-7).

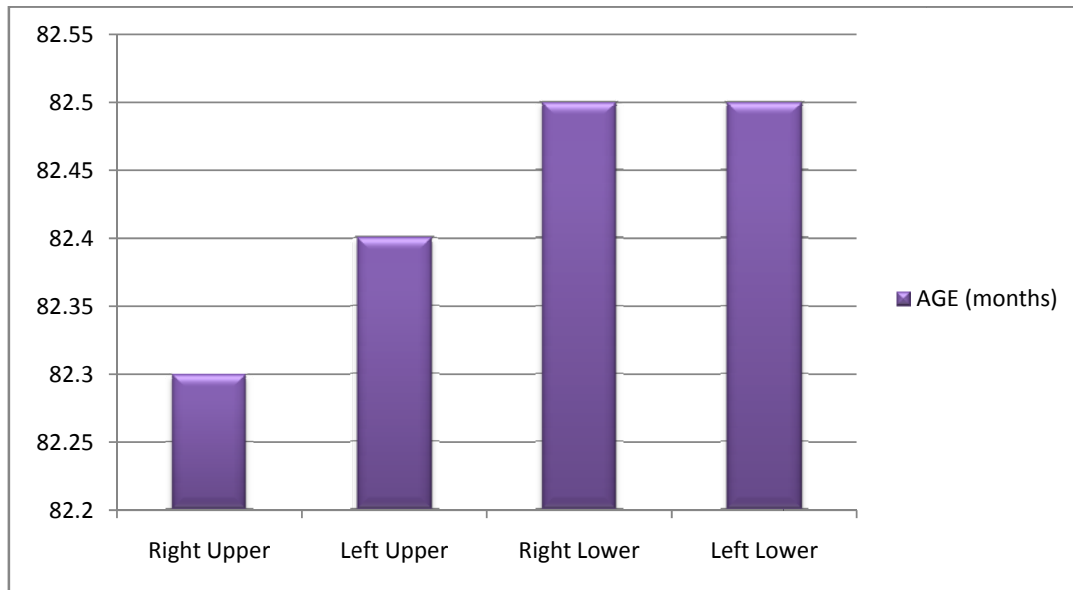
**Table – 6**  
**Complete eruption of Central incisor teeth at different sites**  
**(Age in months)**

Central Incisor	" n "	Age (Months)		Population Mean age estimated at 95% confidence interval (Age in months )
		Mean	S.D	
Right Upper	74	82.3	6.6	80.8 to 83.8
Left Upper	77	82.4	6.5	80.9 to 83.9
Right Lower	73	82.5	6.6	80.9 to 84.0
Left Lower	77	82.5	6.6	81.0 to 84.0

**Chart-8**

**Complete eruption of Central incisor teeth at different sites**

**(Mean age in months)**



The Mean age of complete eruption of central incisor teeth were shown in table – 6 complete eruption of the right upper Central Incisor teeth mean age was  $82.3 \pm 6.6$  months and left upper, right lower and left lower teeth were erupted at the mean ages of  $82.4 \pm 6.5$ ,  $82.5 \pm 6.6$  and  $82.5 \pm 6.6$  months respectively. The estimated mean ages of right upper and left upper, right lower and left upper were in between 80.8 to 83.8, 80.9 to 83.9, 80.9 to 84.0 and 81.0 to 84.0 months respectively at 95% confidence interval (chart-8).

**Table – 7**

**Complete eruption of Lateral incisor teeth at different sites**

**(Age in months)**

Lateral Incisor	" n "	Age (Months)		Population Mean age estimated at 95% confidence Interval (Age in months )
		Mean	S.D	
Right Upper	154	106.3	6.4	105.3 to 107.4
Left Upper	155	106.3	6.4	105.3 to 107.4
Right Lower	158	106.2	6.5	105.2 to 107.2
Left Lower	158	106.2	6.5	105.2 to 107.2

**Chart-9**

**Complete eruption of Lateral incisor teeth at different sites**

**(Mean age in months)**

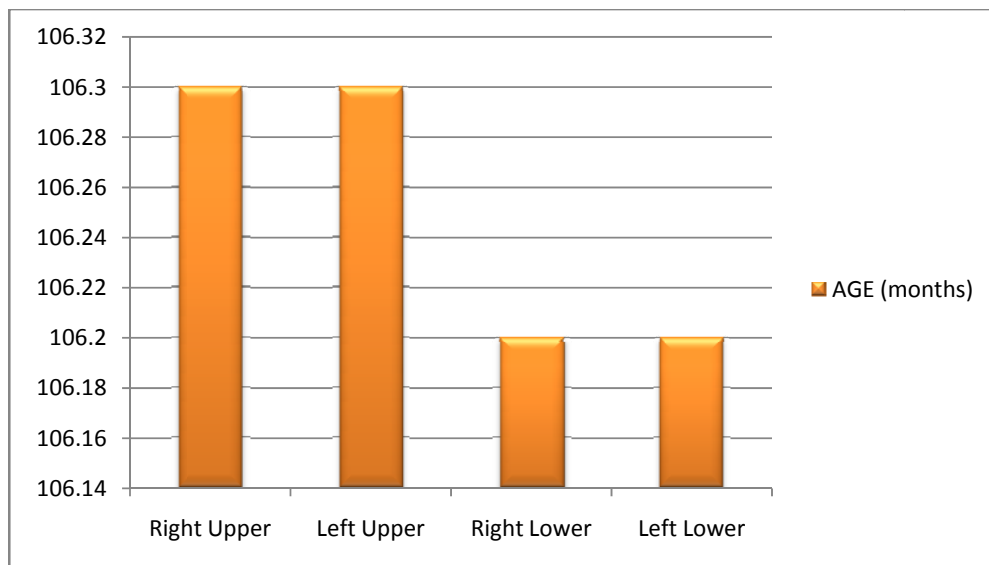


Table – 7 shows the Mean age of complete eruption of Lateral Incisor teeth. The right upper Mean age was  $106.3 \pm 6.4$  months. Mean ages of complete eruption of other Lateral Incisor teeth in left upper, right lower & left lower were  $106.3 \pm 6.4$ ,  $106.2 \pm 6.5$  and  $106.2 \pm 6.5$  months respectively. The Mean estimated ages of them were in between 105.3 to 107.4, 105.3 to 107.4, 105.2 to 107.2 and 105.2 to 107.2 respectively at 95% confidence interval (chart-9).

**Table – 8**

**Complete eruption of Premolar 1 teeth at different sites  
(Age in months)**

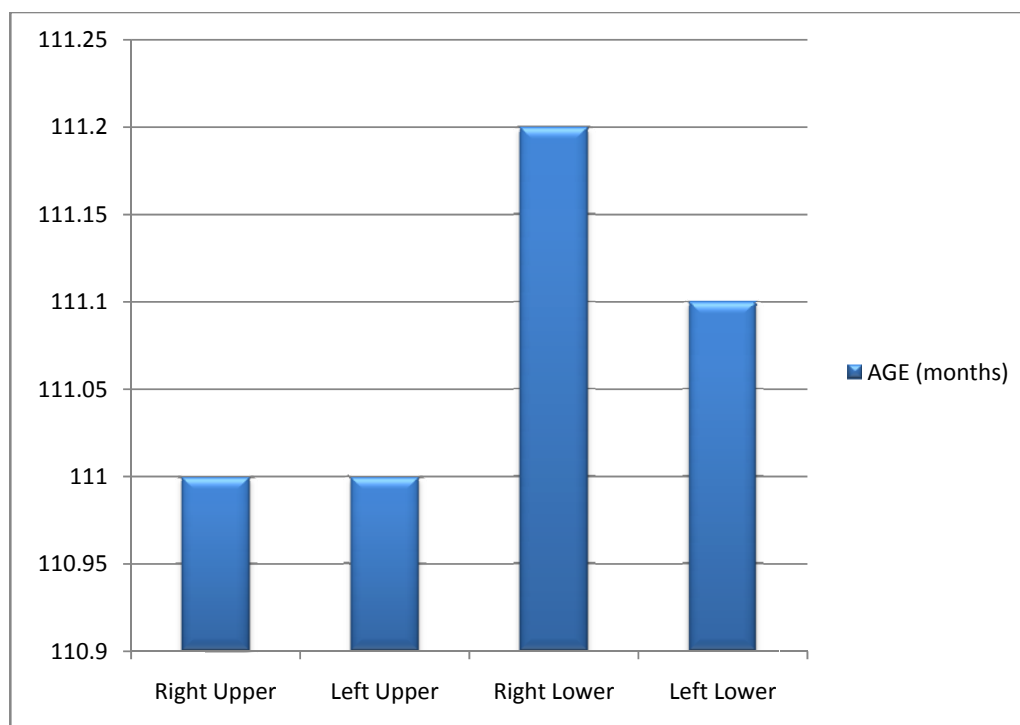
Pre Molar - 1	" n"	Age (Months)		Population Mean age estimated at 95% confidence Interval (Age in months )
		Mean	S.D	
Right Upper	175	111.0	10.0	109.5 to 112.5
Left Upper	183	111.0	10.2	109.5 to 112.5
Right Lower	197	111.2	9.9	109.8 to 112.6
Left Lower	210	111.1	9.9	109.7 to 112.4



**Chart-10**

**Complete eruption of Premolar 1 teeth at different sites**

**(Mean age in months)**



The Pre Molar - 1 complete eruption ages were shown in the above table – 8. The mean ages of complete eruption of Pre Molar – 1 in right upper, left upper, right lower and left lower were  $111 \pm 10$ ,  $111 \pm 10.2$ ,  $111.2 \pm 9.9$  and  $111.1 \pm 9.9$  months respectively. The estimated populations mean ages of them were in between 109.5 to 112.5, 109.5 to 112.5, 109.8 to 112.6 and 109.7 to 112.4 months respectively at 95% confidence interval (chart-10).

**Table – 9**

**Complete eruption of Pre molar 2 teeth at different sites**

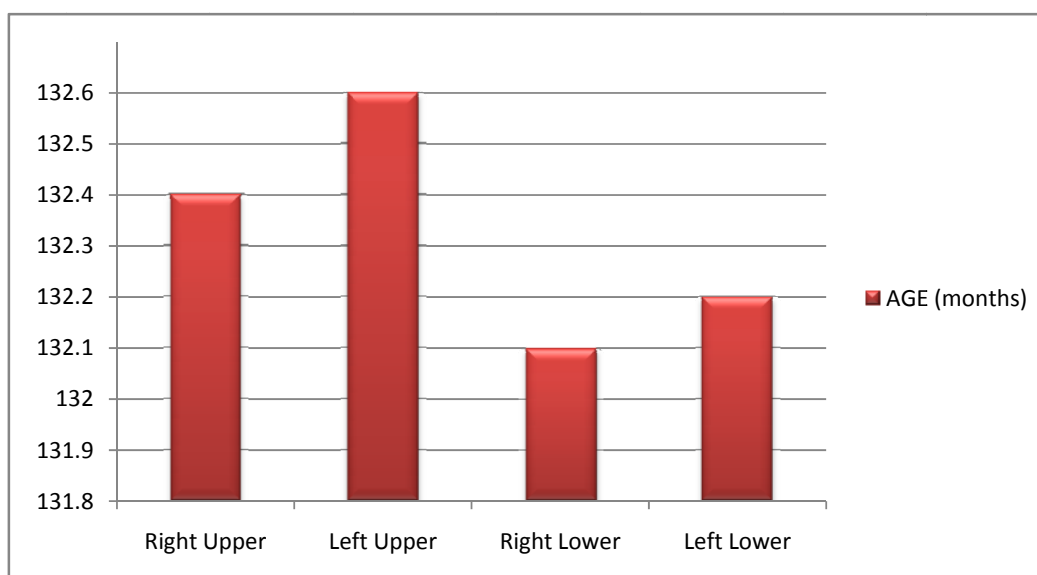
**(Age in months)**

Pre Molar – 2	" n"	Age (Months)		Population Mean age estimated at 95% confidence Interval (Age in months )
		Mean	S.D	
Right Upper	122	132.4	6.6	131.2 to 133.6
Left Upper	122	132.6	6.5	131.4 to 133.8
Right Lower	131	132.1	6.7	131.0 to 133.3
Left Lower	133	132.2	6.6	131.0 to 133.3

**Chart-11**

**Complete eruption of Pre molar 2 teeth at different sites**

**(Mean age in months)**



The Mean ages of Pre Molar - 2 complete eruptions were shown in the above table – 9. The mean ages of complete eruption of Pre Molar – 2 of right upper, left upper, right lower and left lower were  $132.4 \pm 6.6$ ,  $132.6 \pm 6.5$ ,  $132.1 \pm 6.7$  and  $132.2 \pm 6.6$  months respectively. The population estimated mean ages of them were in between 131.2 to 133.6, 131.4 to 133.8, 131.0 to 133.3 and 131.1 to 133.3 months respectively at 95% confidence interval (chart-11).

**Table – 10**

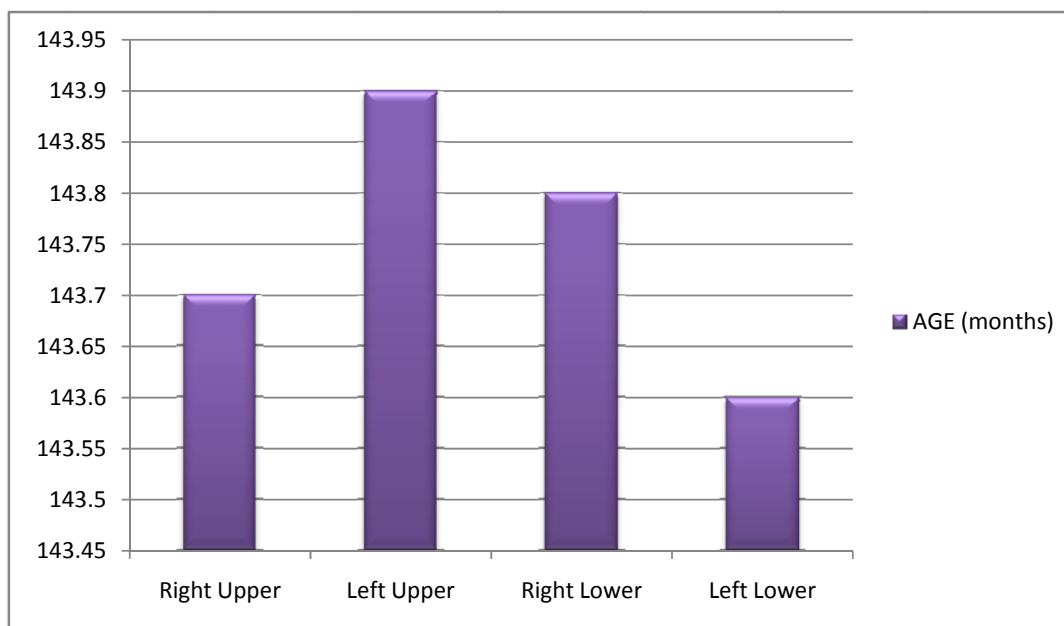
**Complete eruption Canine teeth at different sites (Age in months)**

Canine	" n"	Age (Months)		Population Mean age estimated at 95% confidence Interval (Age in months )
		Mean	S.D	
Right Upper	158	143.7	6.5	142.7 to 144.8
Left Upper	159	143.9	6.6	142.9 to 145.0
Right Lower	171	143.8	6.6	142.8 to 144.8
Left Lower	172	143.6	6.6	142.6 to 144.6

**Chart-12**

**Complete eruption Canine teeth at different sites**

**(Mean age in months)**



The canine teeth complete eruption age was shown in the table – 10. The Mean ages of complete eruption of right upper and left upper, right lower and left lower were  $143.7 \pm 6.5$ ,  $143.9 \pm 6.6$ ,  $143.8 \pm 6.6$  and  $143.6 \pm 6.6$  months respectively. The mean estimated population ages of them were in between 142.7 to 144.8, 142.9 to 145.0, 142.8 to 144.8 and 142.6 to 144.6 respectively at 95% confidence interval (chart-12).

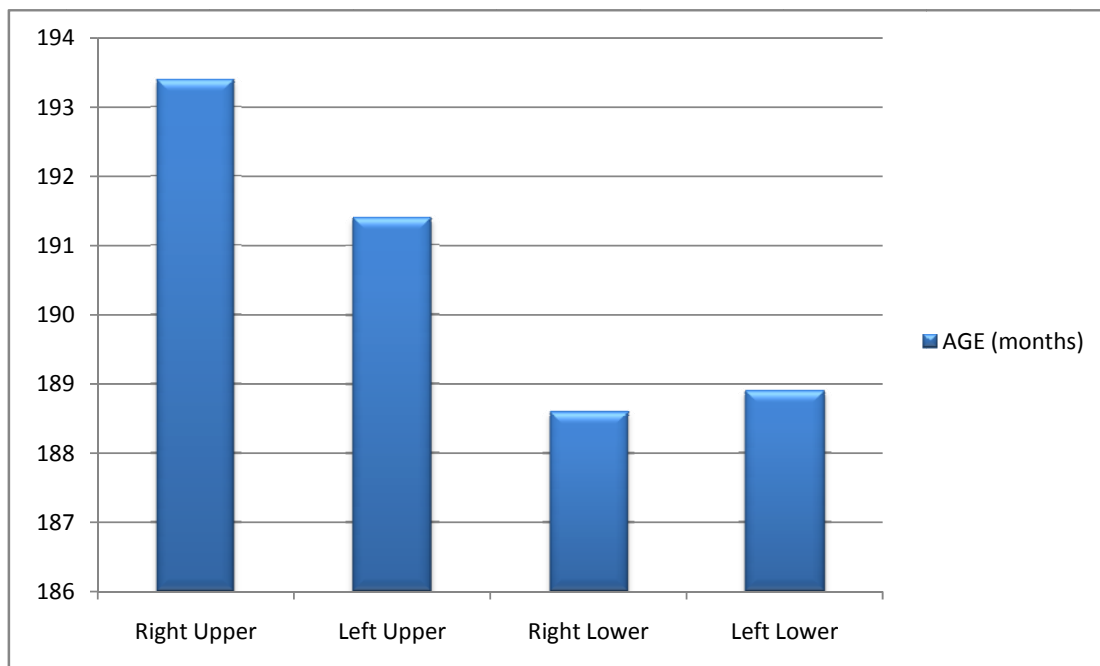
**Table – 11**

**Complete eruption of Molar – 2 at different sites (Age in months)**

Molar - 2	" n"	Age (Months)		Population Mean age estimated at 95% confidence Interval (Age in months )
		Mean	S.D	
Right Upper	250	193.4	9.5	192.2 to 194.6
Left Upper	239	191.4	11.8	190.4 to 193.4
Right Lower	276	188.6	15.0	186.8 to 190.4
Left Lower	293	188.9	14.9	187.2 to 190.6

**Chart-13**

**Complete eruption of Molar – 2 at different sites  
(Mean age in months)**



The table – 11 shows the mean age at complete eruption of Molar – 2. The mean ages of complete eruption of Molar – 2 of right upper, left upper, right lower and left lower were  $193.4 \pm 9.5$ ,  $191.8 \pm 11.8$ ,  $188.6 \pm 15.0$  and  $188.9 \pm 14.9$  months respectively. The estimated mean ages of population lie in between 192.2 to 194.6, 190.4 to 193.4, 186.8 to 190.4 and 187.2 to 190.6 months respectively, in 95% confidence interval (chart-13).

**Table – 12**

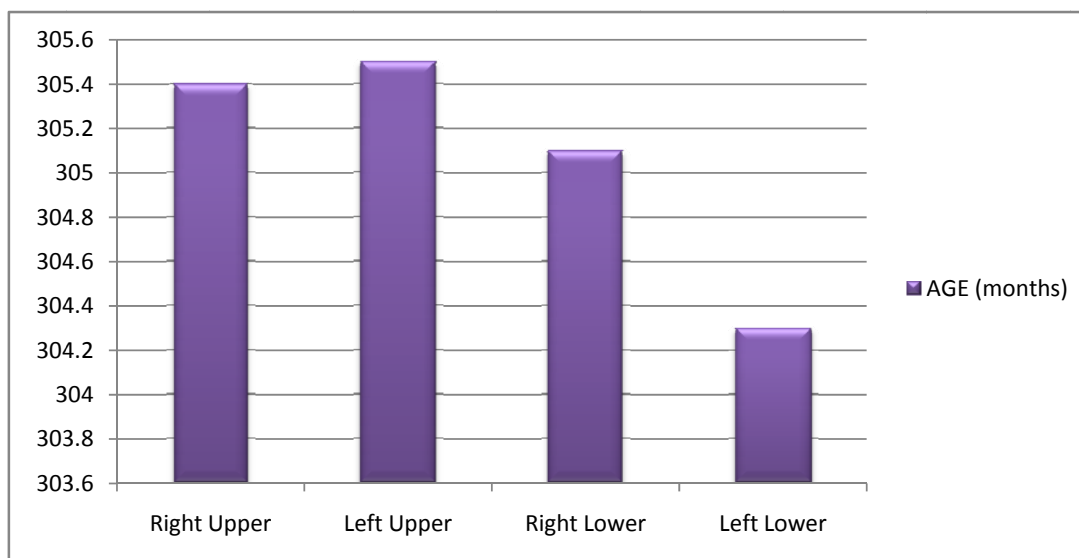
**Complete eruption of Molar – 3 at different sites (Age in months)**

Molar - 3	" n"	Age (Months)		Population Mean age estimated at 95% confidence Interval (Age in months )
		Mean	S.D	
Right Upper	85	305.4	3.0	304.7 to 306.0
Left Upper	111	305.5	3.0	304.8 to 306.0
Right Lower	107	305.1	2.9	304.6 to 305.7
Left Lower	113	304.3	11.0	302.3 to 306.4

**Chart-14**

**Complete eruption of Molar – 3 at different sites**

**(Mean age in months)**



The Mean ages of Molar- 3 complete eruption were shown in the above table – 12. The Mean ages of complete eruption of Molar – 3 of right upper, left upper, right lower and left lower were  $305.4 \pm 3.0$ ,  $305.5 \pm 3.0$ ,  $305.1 \pm 2.9$  and  $304.3 \pm 11.0$  month respectively. The estimated population mean ages of them were in between 304.7 to 306.0, 304.8 to 306.0, 304.6 to 305.7 and 302.3 to 306.4 months respectively at 95% confidence interval (chart-14).

## COMPARISON OF COMPLETE ERUPTION BETWEEN GENDERS:

Comparison of complete eruption of different types of teeth  
between both genders.

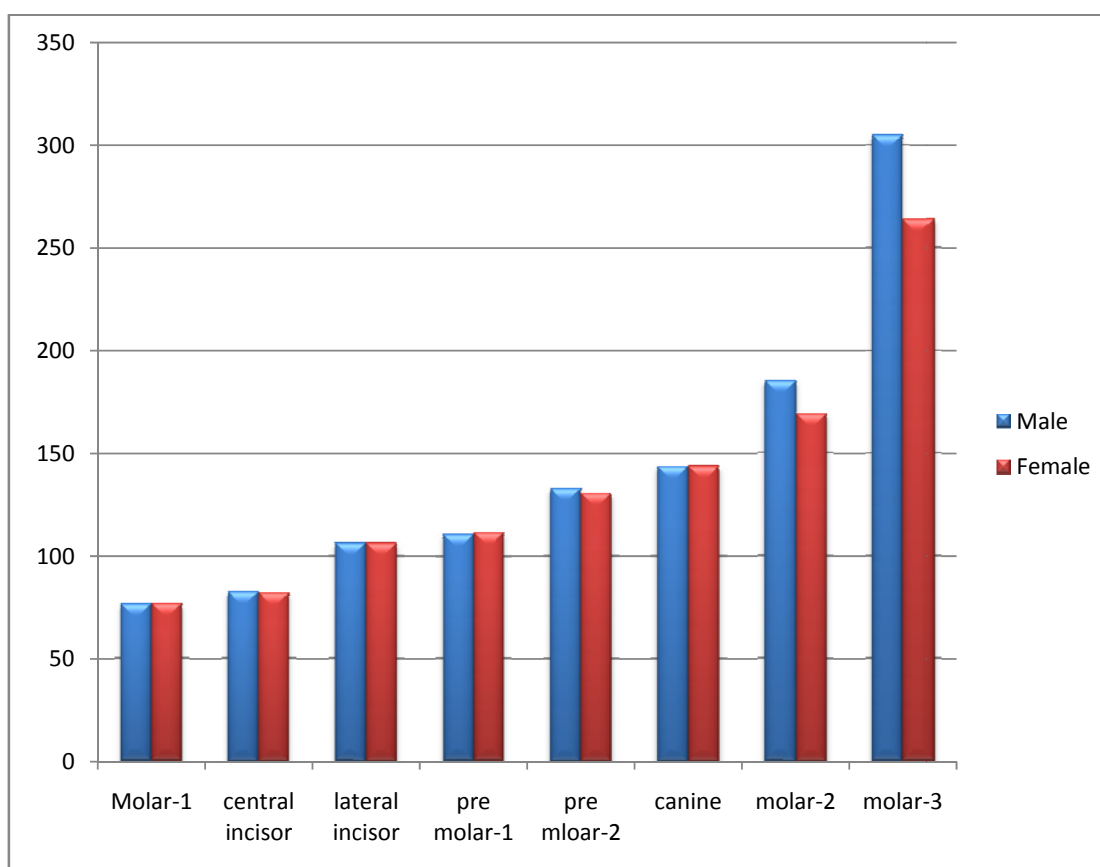
**Table – 13**  
**Comparison of Mean ages of eruption between genders**

Teeth	Male			Female			Difference between Means	" t "	Difference	Significance
	" n "	Mean	S.D	" n "	Mean	S.D				
Molar – 1	25	76.6	2.4	22	76.9	2.9	0.3	0.345	45	P > 0.05
Central Incisor	46	82.3	6.6	37	81.8	6.5	0.5	0.377	81	P > 0.05
Lateral Incisor	87	106.4	6.4	71	106.0	6.6	0.4	0.418	156	P > 0.05
Pre Molar – 1	114	110.8	9.7	103	111.8	10.4	1.0	0.756	215	P > 0.05
Pre Molar – 2	77	132.8	6.5	62	130.6	6.9	2.1	1.92	137	P > 0.05
Canine	104	143.6	6.7	72	143.7	6.4	0.1	0.149	174	P > 0.05
Molar – 2	280	185.1	19.0	94	169.1	20.9	16.0	6.889	824	P < 0.001
Molar – 3	115	305.2	3.0	131	264.2	52	41.0	8.356	244	P < 0.001



**Chart-15**

**Comparison of mean ages of eruption between genders**



The table – 13 shows the ages of complete eruption of various teeth in study subjects. The mean age differences between the gender in respect to Molar – 1, Central incisor, Lateral incisor, Pre Molar – 1, Pre Molar – 2 and Canine teeth were not statistically significant ( $P > 0.05$ ). The mean age of complete eruption of Molar – 2 of male was  $185.1 \pm 19.1$  months and female was  $169.1 \pm 20.9$  months. The difference between these mean ages is 16 months, which was statistically very highly significant ( $P < 0.001$ ). Similarly the means of Molar – 3 was also statistically very highly significant ( $P < 0.001$ ), (chart-15).

## **DISCUSSION**

In my study 1000 subjects were examined to prove or disprove ages of eruption of various permanent teeth described in various textbooks. Those subjects belong to ages between 6 to 25years. Based upon that study, below mentioned ages of complete eruption of permanent teeth were derived.

- Molar 1 completely erupts between 75.9 to 77.9months.
- Central incisor completely erupts between 80.8 to 84.0months.
- Lateral incisor completely erupts between 105.2 to 107.4months.
- Pre Molar 1 completely erupts between 109.58 to 112.6months.
- Pre Molar 2 completely erupts between 131.0 to 133.8months.
- Canine completely erupts between 142.6 to 144.8months.
- Molar 2 completely erupt between 187.2 to 193.6months.
- Molar 3 completely erupt between 302.3 to 306.7months.

In many text books of Forensic Medicine, the ages of eruption of various permanent teeth is given in the form of range. The upper limit in those ranges could be taken as age of complete eruption, which is like as below.

- Molar 1 erupts between 6 to 7 years (72 to 84months).
- Central incisor erupts between 6 to 8years (72 to 96months).
- Lateral incisor erupts between 7 to 9years (84 to 108months).
- Pre Molar 1 erupts between 9 to 11years (108 to 132months).
- Pre Molar 2 erupts between 10 to 12years (120 to 144months).
- Canine erupts between 11 to 12years (132 to 144months).
- Molar - 2 erupts between 12 to 14years (144 to 168months).
- Molar - 3 erupts between 17 to 25years (204 to 300months).

Population mean age estimated at 95% confidence interval of complete eruption of various teeth except in Molar 2 and Molar 3 falls within the range of age of eruption of those teeth mentioned in Text Books followed in routine practice.

Population mean age estimated at 95% confidence interval of complete eruption of Molar 3 is 302.3 to 306.4months, whereas range of eruption of Molar 3 described in Text Books as 204 to 300months. As the deviation is less than a year it is statistically acceptable.

Population mean age estimated at 95% confidence interval of complete eruption of Molar 2 is 186.8 to 194.6months, whereas range of eruption of Molar 2 described in Text Books as 144 to 168months. As the deviation is more than a year it is statistically not acceptable.

In my study, first permanent tooth to erupt is first permanent Molar, which erupts at the age of 75.9 to 77.9 months. This is same as mentioned in textbooks like Modi`s, Lyon`s, Apurba Nandy, Reddy K.S.N, Vij, Subhramaniyam, Parikh, Umadethan, Ajay Kumar, Guharaj and also in studies by Kerr, Shourie, Polson, Gonzales et al, Grewal, Glaister, Rentoul, Ghai and Rajendran & Daniel T.

In my study, permanent Central Incisor is the second permanent teeth to erupt following first Molar. Age of eruption is 80.8 to 84.0 months. This is same as mentioned in textbooks like Modi`s, Lyon`s, Apurba Nandy, Reddy K.S.N, Vij, Subhramaniyam, Parikh, Umadethan, Ajay Kumar, Guharaj, Chaurasia and also in studies by Kerr, Shourie, Polson, Grewal, Ghai and Rajendran & Daniel T.

In my study, permanent Lateral Incisor erupts at the age of 105.2 to 107.4 months, which is similar to textbooks like Modi`s, Lyon`s, Apurba Nandy, Reddy K.S.N, Vij, Subhramaniyam, Parikh, Umadethan, Ajay Kumar, Guharaj and also in studies by Kerr, Ghai and Rajendran & Daniel T.

In my study, permanent Premolar 1 teeth erupt at the age of 109.5 to 112.6 months which is similar to textbooks like Modi`s, Lyon`s, Apurba Nandy, Reddy K.S.N, Vij, Subhramaniyam, Parikh, Umadethan, Ajay Kumar, Guharaj and also in studies by Kerr, Grewal, Ghai and Rajendran & Daniel T.

In my study, permanent Premolar 2 teeth erupt at the age of 131.0 to 133.8 months. This is same as mentioned in textbooks like Modi`s, Reddy K.S.N, Vij, Parikh, Umadethan, Ajay Kumar, Guharaj and also in studies by Kerr, Shourie, Grewal, Glaister and Rajendran & Daniel T.

In my study, permanent Canine teeth erupt at the age of 142.6 to 144.8 months. This is same as mentioned in textbooks like Modi`s, Lyon`s, Apurba Nandy, Reddy K.S.N, Vij, Subhramaniyam, Parikh, Umadethan, Ajay Kumar, Guharaj and also in studies by Kerr, Grewal, Ghai and Rajendran & Daniel T.

In my study, Molar 2 erupts at the age of 187.2 to 193.6 months. This is not consistent with my reference textbooks and studies. Age of eruption in my study is 18.8 to 26.6months later than the age of eruption mentioned in textbooks.

In my study, permanent Molar - 3 erupts completely at the age of 302.3 to 306.7 months. That is very near to the range of eruption described in Text books like Modi`s, Lyon`s, Apurba Nandy, Reddy K.S.N, Vij, Parikh, Ajay Kumar, Guharaj and also in studies by Kerr, Grewal, Tedeschi, Pathak and Jain. Umadethan.B describes that Molar 3 erupts between 17 to 30years.

Hence, my study in complete eruption of ages of various teeth is in par with the ages of eruption of those teeth used in routine practice except Molar -2.So, ages of eruption of permanent teeth used in routine practice

is proved except in Molar – 2, which completely erupts 18.8 to 26.6 months later.

The complete eruption of teeth between the right & left side of upper and lower jaws were no different in terms of percentage except Pre Molar -1. The complete eruption of Pre Molar-1 of right upper quadrant (80.7%) was not significantly differed with the complete eruption of left upper quadrant (84.3%). The complete eruption of Pre Molar-1 of right lower quadrant (90.9%) was significantly differed with the complete eruption of left lower quadrant (96.8%). Hence left lower Pre Molar – 1 erupts earlier than others.

In respect of right quadrant of upper and lower jaws, the complete eruption of teeth such as Molar – 1 Central incisor, Pre Molar – 2, Molar – 2 & Molar -3 were not statistically significant (  $P > 0.05$  ). The complete eruption of Lateral incisor, Pre Molar – 1 and Canine were statistically significant. Hence complete eruption of Lateral incisor, Pre Molar – 1 and Canine are earlier in right lower than right upper quadrant.

In respect of left quadrant of upper and lower jaws, the complete eruption of teeth such as Molar – 1, Central incisor, lateral incisor & Molar -3 were not statistically significant ( $P > 0.05$  ). The complete eruption of Pre Molar – 1 & 2, Canine and molar 2 were statistically significant. Hence complete eruption of Pre Molar – 1 & 2, Canine & Molar- 2 are earlier in left lower than left upper quadrant.

The Mean ages of Male and Females of respective teeth and the results revealed that the difference between Male and Female eruption ages of Molar – 1, Central incisor, Lateral incisor, Pre Molar – 1, Pre Molar – 2, and Canine were not statistically significant (  $P > 0.05$  ). The Mean age of Male Molar -2 teeth was  $185.1 \pm 19.1$  months and the same of the females was  $169.1 \pm 20.9$  months. This difference was statistically significant ( $P < 0.001$ ). The Mean age of Male Molar -3 teeth was  $305.2 \pm 3$  months and the same of the females was  $264.2 \pm 52.6$  months. This difference was statistically significant (  $P < 0.001$ ). Hence complete eruption of only Molar 2 & Molar 3 is earlier in Female than males.

Study by Billewicz et al, savera & steen, Jaswal, Hoffching et al, Hag& Tarange, Muniz, Blankenstein et al, mishra, pahkala & laine, Eskeli, Sharma, Korhonen & Larms, Nizam Naing & mokhtar, Reddy K.S.N describes permanent teeth erupts earlier in females than males. In my study, ages of eruption of permanent teeth remains same in Males and females except in Molar- 2 and Molar- 3, which erupts earlier in females than males.

## CONCLUSION

- Permanent 1<sup>st</sup> molar completely erupts at age between 75.9 to 77.9 months in both gender and both halves of both jaw.
- Permanent central incisor completely erupts at age between 80.8 to 84.0 months in both gender and both halves of both jaw.
- Permanent lateral incisor completely erupts at age between 105.2 to 107.4 months in both gender and both halves of both jaw.
- Permanent Pre molar-1 completely erupts at age between 109.5 to 112.6 months in both gender and erupts earlier in left lower quadrant.
- Permanent Pre molar-2 completely erupts at age between 131.0 to 133.8 months in both gender and both halves of both jaws.
- Permanent Canine completely erupts at age between 142.6 to 144.8 months in both gender and both halves of both jaws.
- Permanent Molar-2 completely erupts at age between 187.2 to 193.6 months, but it erupts earlier in females than in males.
- Permanent Molar-3 completely erupts at age between 302.3 to 306.7 months, but it erupts earlier in females than in males.



## **RECOMMENDATIONS**

- This study is conducted in a limited sample, so this study has to be conducted in huge samples and in varied regions.
- Age of complete eruption of Molar 2 and Molar 3 should be studied separately in large population sample.
- Permanent teeth eruption to be studied elaborately by including other parameters affecting teeth eruption.
- Radiological examination could also be used especially for the third permanent molar.

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## APPENDIX

### ஒப்புதல் கடிதம்

திரு/திருமதி.செல்வன்/செல்வி\_\_\_\_\_

த/பெ.\_\_\_\_\_ ஆகிய நான் முழு மனதுடன்

என் பல் பரிசோதனைக்கு ஒத்துழைப்புத் தருகிறேன். மேலும்

இந்த முடிவுகளை ஆராய்ச்சி படிப்பிற்காகவும், கட்டுரைக்காகவும்

புள்ளியியல் விவரத்திற்கும் பயன்படுத்திக் கொள்ள என் முழு

மனதுடன் சம்மதம் தெரிவித்துக் கொள்கிறேன்.

இடம்:

தேதி:

இப்படிக்கு,



**FIG-3: 108 MONTHS**  
**(8 PERMANANT TEETH,4 TEMPORARY TEETH IN LOWER JAW.)**



**FIG-4: 120 MONTHS**  
**(10 PERMANANT TEETH,2 TEMPORARY TEETH IN UPPER JAW.)**





**FIG-5: 144 MONTHS (12 PERMANANT TEETH IN LOWER JAW.)**



**FIG-6: 168 MONTHS (12 PERMANANT TEETH IN LOWER JAW.)**



**FIG- 7: 192 MONTHS. (12 PERMANANT TEETH IN LOWER JAW)**



**FIG-8: 216 MONTHS ( 14 PERMANANT TEETH IN UPPER JAW)**



**FIG-9: 240 MONTHS  
(14 PERMANANT TEETH IN UPPER JAW WITH SPACE FOR THIRD MOLAR)**

S.No.	Age in years	Month	Days	Sex M/F	CENTRAL INCISOR		LATERAL INCISOR		PRE MOLAR - I		PRE MOLAR - II		CANINE		MOLAR - I		MOLAR - II		MOLAR - III	
					RIGHT - UPPER JAW	LEFT - UPPER JAW	RIGHT - LOWER JAW	LEFT - LOWER JAW	RIGHT - UPPER JAW	LEFT - UPPER JAW	RIGHT - LOWER JAW	LEFT - LOWER JAW	RIGHT - UPPER JAW	LEFT - UPPER JAW	RIGHT - LOWER JAW	LEFT - LOWER JAW	RIGHT - UPPER JAW	LEFT - UPPER JAW	RIGHT - LOWER JAW	LEFT - LOWER JAW
1	6	2	24	M	CE	CE	CE	NCE									CE	CE	CE	CE
2	6	5	2	M	CE	CE	NE	CE									CE	CE	NCE	CE
3	6	3	17	M	CE	CE	CE	CE									NCE	CE	CE	NCE
4	6	7	4	M	CE	CE	CE	NCE									CE	NCE	CE	CE
5	6	5	19	M	NCE	CE	NCE	CE									CE	CE	CE	CE
6	6	6	23	M	CE	CE	CE	CE									CE	CE	NCE	NCE
7	6	3	18	M	NE	NCE	CE	NCE									CE	NCE	CE	CE
8	6	3	21	M	CE	CE	NCE	CE									NCE	CE	CE	CE
9	6	4	9	M	CE	CE	NCE	CE									CE	CE	NCE	NCE
10	6	5	3	M	CE	NCE	CE	NCE									CE	NCE	CE	CE
11	6	8	23	M	CE	CE	CE	CE									CE	CE	CE	CE
12	6	4	24	M	NCE	CE	NCE	NCE									NCE	CE	CE	NCE
13	6	3	16	M	CE	CE	CE	CE									CE	NCE	CE	CE
14	6	2	22	M	CE	NE	NCE	CE									CE	CE	NCE	CE
15	6	4	12	M	CE	CE	CE	NCE									CE	CE	CE	CE
16	6	2	23	M	NCE	CE	CE	CE									CE	NE	CE	CE
17	6	8	12	M	CE	CE	NCE	CE									CE	CE	CE	CE
18	6	11	20	M	CE	CE	CE	CE									CE	CE	CE	CE
19	6	6	27	M	CE	CE	CE	CE									CE	CE	CE	CE
20	6	2	7	M	CE	CE	CE	CE									CE	CE	CE	CE
21	6	6	4	M	CE	CE	CE	CE									CE	CE	CE	CE
22	6	3	13	M	CE	CE	CE	CE									CE	CE	CE	CE
23	6	1	10	M	CE	CE	CE	CE									CE	CE	CE	CE
24	6	8	30	M	CE	CE	CE	CE									CE	CE	CE	CE
25	6	5	12	M	CE	CE	CE	CE									CE	CE	CE	CE
26	6	4	19	F	CE	CE	CE	CE									CE	CE	CE	CE
27	6	10	6	F	CE	CE	CE	CE									CE	CE	CE	CE
28	6	3	12	F	NE	CE	CE	CE									CE	CE	CE	CE
29	6	5	11	F	CE	CE	CE	CE									NCE	CE	CE	CE
30	6	3	4	F	CE	NCE	CE	CE									CE	CE	CE	CE
31	6	1	27	F	CE	CE	CE	CE									CE	CE	CE	CE
32	6	9	14	F	NCE	CE	CE	CE									CE	CE	CE	CE
33	6	7	10	F	CE	CE	NCE	CE									NCE	CE	CE	CE
34	6	2	19	F	CE	CE	CE	CE									CE	CE	CE	CE
35	6	3	17	F	CE	CE	CE	CE									CE	CE	CE	CE
36	6	2	19	F	NCE	CE	CE	CE									CE	CE	CE	CE
37	6	5	17	F	CE	CE	CE	CE									CE	CE	CE	CE
38	6	3	14	F	CE	NCE	CE	CE									CE	CE	NCE	CE
39	6	1	4	F	CE	CE	CE	CE									CE	CE	CE	CE
40	6	9	13	F	CE	CE	CE	CE									CE	CE	CE	NCE
41	6	11	9	F	CE	CE	CE	CE									CE	CE	CE	CE
42	6	3	12	F	CE	CE	CE	CE									CE	CE	CE	CE
43	6	7	13	F	CE	CE	CE	CE									CE	CE	CE	CE
44	6	6	14	F	CE	CE	CE	CE									CE	CE	CE	CE
45	6	5	18	F	CE	CE	CE	CE									CE	CE	CE	CE
46	6	6	10	F	CE	CE	CE	CE									CE	CE	CE	CE
47	6	3	15	F	CE	CE	CE	CE									CE	CE	CE	CE
48	7	4	29	M	CE	CE	CE	CE	CE	CE	CE	NCE	NE	CE	NE	NE	CE	CE	CE	CE
49	7	8	18	M	CE	CE	CE	CE	NCE	CE	CE	CE	NE	NE	NE	NE	CE	CE	CE	CE
50	7	7	24	M	CE	CE	CE	CE	CE	CE	CE	NCE	CE	NE	NE	NE	CE	CE	CE	CE
51	7	3	25	M	CE	CE	CE	CE	CE	CE	CE	CE	NCE	NE	NCE	NE	CE	CE	CE	CE

52	7	6	18	M	CE	CE	CE	CE	CE	NCE	CE	CE	NE	NE	NE	NE									CE	CE	CE	CE									
53	7	5	10	M	CE	CE	CE	CE	CE	CE	CE	NCE	NE	NE	NE	NE									CE	CE	CE	CE									
54	7	4	17	M	CE	CE	NCE	CE	CE	CE	CE	NE	NE	NE	NE	NCE									CE	CE	CE	CE									
55	7	3	12	M	CE	CE	CE	CE	CE	CE	NCE	CE	CE	NCE	NE	NE									CE	CE	CE	CE									
56	7	5	14	M	CE	CE	CE	CE	CE	NE	CE	CE	NCE	NE	NE	NE	NE								CE	CE	CE	CE									
57	7	7	17	M	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NCE									CE	CE	CE	CE									
58	7	4	19	M	NCE	CE	CE	CE	CE	CE	CE	NE	NCE	NE	NE	NE									CE	CE	CE	CE									
59	7	7	2	M	CE	CE	CE	CE	CE	CE	CE	NCE	CE	NE	NCE	NE	NE								CE	CE	CE	CE									
60	7	2	12	M	CE	CE	CE	CE	CE	CE	CE	NCE	NCE	NE	NE	NCE									CE	CE	CE	CE									
61	7	6	14	M	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE									CE	CE	CE	CE									
62	7	4	16	M	CE	CE	CE	CE	CE	CE	NE	CE	NCE	NCE	NE	NE									CE	CE	CE	CE									
63	7	3	14	M	CE	CE	NCE	CE	CE	CE	CE	NCE	NE	NE	NE	CE									CE	CE	CE	CE									
64	7	7	19	M	CE	CE	CE	CE	CE	CE	NE	CE	NCE	NCE	NE	NE									CE	CE	CE	CE									
65	7	3	6	M	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE									CE	CE	CE	CE									
66	7	9	2	M	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE									CE	CE	CE	CE									
67	7	4	7	M	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE									CE	CE	CE	CE									
68	7	5	8	M	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE									CE	CE	CE	CE									
69	7	5	9	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE									CE	CE	CE	CE									
70	7	6	0	F	CE	CE	CE	CE	CE	CE	NCE	CE	NE	NE	NE	NCE									CE	CE	CE	CE									
71	7	4	16	F	CE	CE	CE	CE	CE	CE	CE	NCE	NCE	CE	NCE	CE									CE	CE	CE	CE									
72	7	3	13	F	NCE	CE	CE	CE	CE	CE	CE	CE	NE	NE		NCE									CE	CE	CE	CE									
73	7	9	23	F	CE	CE	CE	CE	NCE	CE	NE	NCE	NE	NE	NE	CE									CE	CE	CE	CE									
74	7	4	12	F	CE	CE	CE	CE	CE	CE	CE	CE	NE	NCE	CE	NE									CE	CE	CE	CE									
75	7	5	14	F	CE	NCE	CE	CE	CE	CE	CE	CE	NE	NE	NE	CE									CE	CE	CE	CE									
76	7	3	21	F	CE	CE	CE	CE	CE	CE	NCE	CE	CE	NE	NCE	NE									CE	CE	CE	CE									
77	7	4	20	F	NCE	CE	CE	CE	CE	CE	NE	CE	NE	NE	NE	NCE									CE	CE	CE	CE									
78	7	7	12	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE									CE	CE	CE	CE									
79	7	8	15	F	CE	CE	CE	CE	CE	CE	NCE	NCE	NE	CE	NE	NCE									CE	CE	CE	CE									
80	7	7	16	F	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE									CE	CE	CE	CE									
81	7	4	17	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	NCE	CE	NCE									CE	CE	CE	CE								
82	7		14	F	CE	CE	CE	CE	CE	CE	NE	CE	NE	NE	NE	NE									CE	CE	CE	CE									
83	7	4	15	F	CE	CE	CE	CE	CE	CE	CE	NE	NE	NCE	NE	NE									CE	CE	CE	CE									
84	8	3	16	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE									
85	8	6	12	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE									
86	8	2	13	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE									
87	8	2	15	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	NCE	CE									CE	CE	CE	CE								
88	8	3	28	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE									
89	8	3	22	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE									
90	8	1	26	M	CE	CE	CE	CE	NCE	CE	CE	CE	CE	CE	CE	CE	NCE								CE	CE	CE	CE									
91	8	1	15	M	CE	CE	CE	CE	CE	NCE	CE	CE	CE	CE	NCE	CE	CE								CE	CE	CE	CE									
92	8	1	25	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE									
93	8	2	4	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	NCE	CE								CE	CE	CE	CE									
94	8	3	3	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE									
95	8	5	9	M	CE	CE	CE	CE	CE	CE	CE	CE	NE	NCE	CE	CE									CE	CE	CE	CE									
96	8	6	3	M	CE	CE	CE	CE	CE	NE	CE	CE	CE	CE	CE	NE	CE								CE	CE	CE	CE									
97	8	7	3	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE									
98	8	8	4	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE								CE	CE	CE	CE									
99	8	9	5	M	CE	CE	CE	CE	NCE	CE	CE	CE	CE	CE	CE	CE	CE								CE	CE	CE	CE									
100	8	5	3	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	NCE	CE	NCE								CE	CE	CE	CE									
101	8	4	4	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE									
102	8	6	9	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE									
103	8	5	7	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE								CE	CE	CE	CE									
104	8	7	14	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE									
105	8	3	12	M	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	NE	CE									CE	CE	CE	CE									
106	8	5	15	M	CE	CE	CE	CE	NE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE									
107	8	8	16	M	CE	CE	CE	CE	CE	CE	CE	CE	NE	NCE	CE	CE									CE	CE	CE	CE									
108	8	9	17	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE									
109	8	3	12	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE									
110	8	2	25	M	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE									CE	CE	CE	CE									

111	8	3	26	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE								
112	8	2	27	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE								
113	8	3	28	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE									CE	CE	CE	CE								
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115	8	5	12	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE									CE	CE	CE	CE								
116	8	4	21	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE									CE	CE	CE	CE								
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130	8	6	14	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE								
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149	8	7	21	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE								
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166	8	6	29	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE								
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169	8	2	12	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE								

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229	9	5	13	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									CE	CE	CE	CE										
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247	10	2	17	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	NCE	CE	NCE	CE	NCE	NE	NCE	NE	NCE	CE	CE	CE	CE							
248	10	5	16	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	NCE	CE	NE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE	CE									
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251	10	6	13	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									
252	10	4	12	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NCE	CE	CE	CE	CE	CE	NE	NE	NE	NE	CE	CE	CE	CE	CE	CE	CE		
253	10	4	15	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	NE	NCE	NE	NE	CE	CE	CE	CE	CE	CE		
254	10	5	11	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE	CE	CE	CE	CE	CE	CE	CE		
255	10	2	14	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NCE	CE	CE	CE	CE	CE	NE	NE	NE	NCE	CE	CE	CE	CE	CE	CE	CE		
256	10	2	21	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	NCE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE	CE	CE	CE	CE	CE	CE	CE		
257	10	1	27	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE	CE	CE	CE	CE	CE	CE	CE	
258	10	9	29	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NCE	NE	CE	CE	CE	CE	CE	CE	CE		
259	10	10	14	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	NCE	CE	CE	CE	CE	CE	NE	NE	NE	NCE	CE	CE	CE	CE	CE	CE	CE		
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261	10	4	23	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NCE	NE	NE	CE	CE	CE	CE	CE	CE	CE		
262	10	3	27	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NCE	CE	CE	CE	CE	CE	CE	CE		
263	10	4	29	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE	NCE	CE	CE	CE	CE	CE	NE	NE	NE	NE	CE	CE	CE	CE	CE	CE	CE		
264	10	5	20	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE	CE	CE	CE	CE	CE	CE	CE		
265	10	5	12	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	NCE	NE	CE	CE	NCE	NE	CE	CE	NE	NE	NCE	NCE	CE	CE	CE	CE	CE	CE	CE		
266	10	6	16	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE	NCE	CE	CE	CE	CE	CE	CE	NE	NE	NCE	NCE	CE	CE	CE	CE	CE	CE	CE		
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273	10	1	19	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NCE	NE	NCE	CE	CE	CE	CE	CE	CE	CE		
274	10	3	2	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE	CE	CE	CE	CE	CE	CE	CE		
275	10	2	30	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	NCE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE	CE	CE	CE	CE	CE	CE	CE		
276	10	5	15	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NCE	CE	CE	CE	CE	CE	CE	CE		
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281	10	6	19	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	NCE	CE	NE	NCE	CE	CE	CE	CE	CE	CE	NE	NE	NCE	NE	CE	CE	CE	CE	CE	CE	CE		
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283	10	5	12	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NCE	CE	CE	CE	CE	CE	CE	CE		
284	10	4	13	F	CE	CE	CE	CE																														



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347	11	5	23	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									
348	11	7	12	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									
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361	11	2	4	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									
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370	11	3	21	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE	CE	CE									
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374	11	9	5	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE	CE	CE	CE	CE									
375	11	10	23	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE	CE	CE	CE									
376	11	1	24	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									
377	11	5	25	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									
378	11	4	12	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE	CE									
379	11	3	13	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE	CE	CE	CE									
380	11	4	9	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE	CE	CE									
381	12	6	7	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE									
382	12	7	21	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE	CE	CE	CE	NCE	NE	NCE	NE					
383	12	5	20	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NCE					
384	12	3	21	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE	CE				
385	12	4	25	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	NCE	CE	CE	CE	NE	NCE	NE	NE					
386	12	5	16	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NCE	NCE					
387	12	8	18	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	NE	NE					
388	12	9	12	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	CE	NE					
389	12	10	21	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NCE					
390	12	12	14	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE	CE	CE	CE	NE	NCE	NE	NE					
391	12	4	15	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NCE	NE					
392	12	6	17	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	NE	NE	NE	NE				
393	12	8	12	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE	CE	CE	NE	NE	NE	NCE					
394	12	2	13	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE					
395	12	4	14	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NCE	NE					
396	12	8	11	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NCE					
397	12	10	21	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	CE	CE					
398	12	11	2	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NCE	NE					
399	12	9	9	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE					
400	12	7	27	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE					
401	12	4	12	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NCE	NCE					
402	12	5	8	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NCE	CE					
403	12	6	2	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NCE	NE	NCE					
404	12	10	9	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE					
405	12	5	18	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	CE	NE					

[illegible]

465	12	3	30	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NCE	NE					
466	12	1	13	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NCE	NE					
467	12	5	15	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NCE	NCE	CE					
468	12	6	17	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	CE	NCE					
469	12	9	18	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NE	NE					
470	12	1	14	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE	CE					
471	12	1	10	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NCE	NE					
472	12	6	21	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NCE	NE	CE					
473	12	2	25	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NCE	NE					
474	12	10	26	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	NE	CE					
475	12	2	20	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NE	NCE	NE					
476	12	5	28	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NCE	CE	CE					
477	13	8	16	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NCE	CE	CE				
478	13	3	17	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE					
479	13	9	13	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE	CE					
480	13	11	21	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	NCE	CE	CE				
481	13	1	30	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE					
482	13	4	9	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE					
483	13	9	7	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE	CE					
484	13	2	5	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	NCE	CE	CE					
485	13	8	14	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE					
486	13	3	19	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE					
487	13	6	21	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE					
488	13	4	26	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	NCE	CE	CE					
489	13	5	28	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE					
490	13	3	20	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE					
491	13	6	24	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	NCE	CE					
492	13	9	26	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE					
493	13	7	21	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	NCE					
494	13	6	13	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	NCE	CE	CE					
495	13	9	15	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE					
496	13	2	3	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	NCE	CE	CE					
497	13	3	15	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE					
498	13	4	2	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	NCE	CE	CE					
499	13	6	16	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE					
500	13	5	7	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	NE	CE	CE					
501	13	5	29	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	NCE	CE	NCE				
502	13	5	25	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE	CE					
503	13	2	26	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	NCE	CE	CE					
504	13	3	31	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE					
505	13	3	2	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE					
506	13	4	5	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE					
507	13	9	7	M	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE					
508	13	1	19	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE					
509	13	8	14	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE					
510	13	2	16	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NE	CE	CE	CE					
511	13	3	14	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE					
512	13	4	15	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE					
513	13	7	19	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	NCE	CE	CE					
514	13	5	21	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE					
515	13	6	20	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE					
516	13	2	28	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE					
517	13	4	23	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE					
518	13	7	17	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE					
519	13	9	11	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE					
520	13	1	25	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	NCE	CE	CE	CE					
521	13	10	16	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE					
522	13	2	12	F	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE																			

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